

**ANNUAL REPORT
OF THE
INDIAN CENTRAL COTTON COMMITTEE,
BOMBAY,
FOR THE
YEAR ENDING 31st AUGUST
1935.**

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Annual Report of the Indian Central Cotton
Committee for the year ending
31st August 1935.

CHAPTER I.

As a result of one of the recommendations of the Indian Cotton Committee of 1918-19 the Indian Central Cotton Committee was constituted by the Government of India in the Department of Revenue and Agriculture in their Resolution No 404-22 dated the 31st March 1935. Its functions were originally purely of an advisory character but with its incorporation in the Indian Cotton Cess Act in 1923, funds were made available "for the improvement and development of the growing, marketing and manufacture of cotton in India". The Committee's functions are thus dual in character

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where cotton is an important crop and for the extension and marketing of improved varieties of cotton. The research section of the Committee's work has passed the experimental stage, as will be seen in Chapters IV and V of this report

The Committee further offers a common meeting ground for all branches of the cotton industry and all the main interests associated with cotton viz., the grower the ginner the exporter the millowner and the agricultural expert, are represented on it, its primary concern however, is the interest and welfare of the cotton grower

PERSONNEL

2 A list of members of the Committee as it stood on the 31st August 1935 is given in *Appendix I*. Under the Indian Cotton Cess Rules members, who are not *ex-officio* members hold office for three years and one third of their number retire each year in rotation

At its meeting in August 1935, the Committee recorded its appreciation of the work of its President, Dewan Bahadur Sir T. Vijayaraghavacharya, K.B.E., on the eve of his retirement, in the following Resolution —

"THAT THIS COMMITTEE APPRECIATES THE WORK OF THE PRESIDENT AND HIS ASSISTANT SECRETARY."

His consistent courtesy to each member and his unrivalled tact and patience in dealing with the various questions that were dealt with by the Committee have been an asset to the Committee.

The Committee records its best thanks to Sir T. Vijayaraghavacharya for the continued close attention he gave to details of the question disposed off during this period and it tenders him its best wishes on the eve of his retirement."

SUB-COMMITTEES

3 Most of the detailed work of the Committee is carried on by means of Sub-Committees and thereby much of its time is saved at its half-yearly meetings. The Committee is greatly indebted to the members of these Sub-Committees for the invaluable assistance they have given in furthering the work of the Committee and whilst it would be invidious to single out any for special mention, it feels that it did not record its express and Local Sub-Committees

by these Sub-Committees are called upon to attend meetings at much more frequent intervals than is the case with members of the other Sub-Committees

The functions of the various Sub-Committees are detailed below and their composition as on the 31st August 1935 will be found in *Appendix II*

(a) *The Standing Finance Sub-Committee* is a statutory Sub-Committee and is the principal executive body of the Committee. By Resolution of the Committee one of the members of this Sub Committee must be a representative of the cotton growers. Seven meetings of the Sub-Committee were held during the year

(b) *The Local Sub Committee* which met seven times in the year under report deals with all matters of a general nature, not involving finance which cannot be postponed for consideration to the half yearly meetings of the full Committee

(c) *The Cotton Ginning and Pressing Factories Sub-Committee* is also a statutory body appointed to deal with matters arising out of the Cotton Ginning and Pressing Factories Act of 1925. It did not meet during the year

(d) *The Agricultural Research Sub Committee* ordinarily assembles half yearly during the meetings of the full Committee, reports on the progress made on schemes financed by the Committee, examines proposals for new schemes or extensions of those already in operation and considers the reports of research students

(e) *The Technological Research Sub Committee*, like the Agricultural Research Sub-Committee, generally meets during the half yearly meetings of the Indian Central Cotton Committee and considers all matters connected with the Technological Laboratory and Technological Research

(f) *The Research Students Selection Sub Committee*, as its name implies, selects students to whom scholarships or training grants are awarded for the purpose of undergoing training in research in the several sciences pertaining to cotton. One meeting of this Sub-Committee took place during the year

(g) *The Sub Committee on Malpractices* was formed in order to deal with all references concerning malpractices and abuses which adversely affect Indian cotton. There were no matters during the year which necessitated a meeting of this Sub-Committee being called.

(h) *The Forecast Improvement Sub Committee* usually meets half yearly, its principal business being the improvement of the cotton forecasts of India.

(i) *The Special Sub Committee on Wider Markets* which met twice during the year was appointed in August 1933 with the object of examining the question of finding wider markets for Indian cotton.

(j) *The Standards Sub Committee* is concerned with the preparation for use in India of universal standards of certain growths of cotton dealt with in common both by the East India Cotton Association and the Karachi Cotton Association and of certain other varieties with which only the former Association is concerned. This Sub Committee which was constituted in April 1933 met five times in the year under report.

In addition to the above Standing Sub-Committees, Special Sub-Committees are appointed from time to time to deal with specific matters which do not fall within the purview of any of the other Sub Committees.

4 Whilst the Committee is representative of practically all sections of the cotton trade in India, it also enjoys the privilege of deputing representatives to serve on other bodies. Thus Sardar Rao Bahadur Bhimbhai Ranchodji Naik represents the Committee on the Imperial Council of Agricultural Research and on the Board of Directors of the East India Cotton Association the Committee is represented by three members Sardar Rao Bahadur Bhimbhai Ranchodji Naik Mr N M Deshmukh and Mian Nurullah being its nominees in the cotton year 1934-35. On the Joint Sub-Committee of search and of the Committee in respect of growing cotton, sugar cane represented by Sir Purshotamdas

Thakurdas Sardar Rao Babadur Bhimbhai Ranchodji Naik, Mr J Vonesch Mr Chunilal B Mehta Mr Chumanlal G Parekh (representative of the East India Cotton Association) and the Secretary. Its representatives on the Institute of Plant Industry, Indore, are the President, (Dewan Bahadur Sir T Vijayaraghavacharya), Vice President, (Sir Purshotamdas Thakurdas) Mr Chunilal B Mehta, Mr Kasturbhai Lalbbai, Sardar Rao Bahadur Bhimbhai Ranchodji Naik Mr S D Saklatvala, Mr J Vonesch Mr G C R Colendge Rao Bahadur G R Koithare Mian Nurullah Dr W Burns and the Secretary.

In response to an invitation from the International Federation of Master Cotton Spinners and Manufacturers' Associations, the Committee appointed Dr W Burns and Mr W J Jenkins both members of the Committee, as its Congress which was held at Milan 1935. Only Dr Burns however,

MEETINGS

5 The Indian Central Cotton Committee held two meetings during the year under review, both at Bombay. The first meeting took place on the 4th and 5th February 1935, Mr H C Short, Commissioner in India, Lancashire Indian Cotton Committee, attending it as a visitor

The 19th and 20th August 1935, the Right Honourable Michael G C I E, M C, Governor of Bombay. Amongst the other visitors present were the Hon'ble Dewan Bahadur S T Kambli, J P, Minister for Education, Government of Bombay, the Hon'ble Khan Bahadur D B Cooper, Member for Revenue and Finance, Government of Bombay, Mr Kasturbhai Lalbhai, Pankore's Naka Ahmedabad, and Mr M D Williams of the British Cotton Growing Association (Punjab), Ltd, Khanewal

A list of the more important resolutions passed at these two meetings will be found in *Appendix III*

STAFF

6 Mr P H Rama Reddi held charge of the office of Secretary throughout the year

The post of Deputy Secretary remained vacant

Dr Nazir Ahmad held the post of Director, Technological Laboratory, during the year, and Mr R D Mihra that of Publicity Officer

A temporary gazetted post of Personal Assistant to the Secretary was created for a period of one year in the first instance and Mr C J Bocarro, the Office Superintendent, was appointed to it

The office staff continued to give its loyal co-operation, and I wish to record once again my appreciation of their help during the year

PROVINCIAL COTTON COMMITTEES

7 The value of provincial cotton committees in dealing with problems of provincial importance has been emphasised in previous reports and it is gratifying to note that where such provincial committees have been functioning the work done by them has been of appreciable assistance to the Committee

was transacted by them. It is hoped that the current year will see a revival of the activities of the other provincial cotton committees

CHAPTER II:

WORK OF THE YEAR.

COTTON POLICY

8 THE year under review saw the completion of the Committee's investigations into the possibilities of growing long and medium staple cottons in the present short staple cotton areas of India. This investigation was the immediate result of the threatened Japanese boycott of Indian cotton in 1933

reference to the quality of the cottons grown, the factors limiting the growth of superior varieties and the characteristics of the cottons considered suitable for these tracts, the Committee came to the conclusion that for the Surti, Broach, Kurnta-Dharwar, Raichur, Tinnevelly, Cambodia, Gaorani, and Central Provinces and Berar areas, and the American tract^s of the Punjab and Sind, suitable long or medium staple varieties were already on hand. In the Khandesh, Salems, Westerns and Northernns, Cocanada, Hyderabad Oomras and Malvi tracts types of cotton superior to the existing inferior local mixtures have been isolated or experiments were under way with a view to

grown in other tracts with similar climatic and soil conditions may prove successful in some of them. A solution of the problem confronting the successful growing of medium and long staple cottons in the Northernns and Westerns tract may lie in the investigation into dry cultivation whilst a study of Persian cottons might solve the problem of the Dholleras tract. In the United Provinces the eradication of the pink boll-worm seems to be the first step required to be taken before any attempt is made to improve the quality of the cotton.

COMPACT BLOCK OF LONG STAPLE COTTON IN SIND

agreement w
Sind that the
a purpose
legislation to prevent the growing of short staple cotton in the proposed block

marketing. Whilst expressing its appreciation of the action taken by the Bombay Government, the Committee at its meeting held on the 19th August 1935 urged upon them the desirability of introducing such legislation as might be considered necessary to achieve the desired object if the measures contemplated by them proved inadequate, and also drew their attention to the serious danger to which the better quality cottons, capable of spinning 30's counts and over, grown in the proposed compact block were exposed by admixture not only with *Dess* but also 4-F American cotton which is suitable for 20's counts only. To obviate this danger it has been recommended to the Local Government that the proposed compact block should be reserved for growing only the pure types of long staple cotton distributed by the Agricultural Department and that the Cotton Transport Act should be applied to it to prevent the importation of *kapas* from outside the area for purposes of mixing.

MORNING BROADCAST OF COTTON PRICES

10. The Committee made a broadcast of cotton prices

India to
news per
station

morning broadcast of cotton prices was of considerable benefit not only to merchants and big cotton growers, some of whom had specially installed receiving sets in order culturist generally who often too coming through the radio before from telegraphic communication, for the purpose of installing receiv

of the early morning broadcast of cotton news, up country cotton markets also - them depended in New York.
Live iteration of the

Government of India

SPREAD OF GARROW-HILL COTTON IN THE CENTRAL PROVINCES

11. The rapid spread in the Central Provinces of Garrow-Hill cotton, a very strong with wool, This cotton cotton of the

accordingly recommended growing and handling of Berar would be effective

Lancashire Indian Cotton Committee

would be found to be an acceptable effort on the part of that Committee to broaden and strengthen co-operation between India and the United Kingdom

of Indian cotton in Lancashire and assuring that Committee of its desire to co-operate to the best extent possible in matters affecting the interests of both bodies
the total takings for the three years were —

	<i>Season</i> Bales	<i>Season</i> Bales	<i>Season</i> Bales
	<u>1934-35</u>	<u>1933-34</u>	<u>1932-33</u>
Total	<u>393,784</u>	<u>361,546</u>	<u>229,740</u>

THE COTTON TRANSPORT ACT

13 At the request of the Indian Central Cotton Committee the Government of India, in 1923, passed the Cotton Transport Act which enables local Governments to prohibit the import of cotton into any area within their jurisdiction. The Act was devised to prevent the import, for mixing and substitution, of inferior cotton into areas growing superior varieties.

Madras — There was no change in the protected areas in the Madras Presidency

Bombay — The seven protected areas notified in the Bombay Presidency
the subject is under the consideration of the Local Government

Bengal — cotton into these districts for the purpose of mixing

Indian States —
Baroda, Indo
the Bombay]

ided during the
the Narsingh
it the import of

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Government of India

SPREAD OF GARROW HILL COTTON IN THE CENTRAL PROVINCES

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accordingly recommended that nothing short of a complete prohibition of the growing and handling of Garrow-Hill cotton in the Central Provinces and Berar would be effective.

LANCASHIRE INDIAN COTTON COMMITTEE

broaden and strengthen co-operation between India and the United Kingdom. Several members commented favourably on the report and considered it to be a valuable record of what was being done by the Lancashire Committee to popularise the use of Indian cottons in the United Kingdom. The Committee at its meeting in August 1935 passed a unanimous resolution appreciating the efforts made by the Lancashire Indian Cotton Committee to extend the use of Indian cotton in Lancashire and assuring that Committee of its desire to co-operate to the fullest extent possible in matters affecting the interests of both bodies. According to the Liverpool Cotton Association Weekly Circulars, the total takings of Indian cotton by the United Kingdom during the last three years were —

	<i>Season</i>	<i>Season</i>	<i>Season</i>
	Bales	Bales	Bales
	<u>1934-35</u>	<u>1933-34</u>	<u>1932-33</u>
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THE COTTON GINNING AND PRESSING FACTORIES ACT.

14 Over a dozen cases of infringements of the Act were reported during the year to the authorities concerned. In some either the wrong year or indecipherable or incorrect marks were put on bales and in others, press marks were absent. In almost all cases warnings were given to the factory-owners. Where it was found that breaches were due to misunderstanding on the part of the factory-owners instructions as to the proper method of marking were issued to them and they were directed to be more careful in future. In one instance where the use of unauthorised weights was detected in a ginning and pressing factory and the only action taken was a severe warning to the factory owner by the Collector of the District, the attention of the Local Government concerned was drawn to the leniency of the punishment and they were requested to instruct trying officers to take a serious view of such offences and to inflict adequate punishment in future.

In December 1934, the International Federation of Master Cotton Spinners' and Manufacturers' Associations, Manchester, requested the Committee to press the Government of India for the re imposition of the rule requiring press marks to be indelibly stamped on the hoops of cotton bales, the reason stated being that the hessian covering of bales often got damaged or was cut out during sampling, thus making it impossible for the bales to be identified. The original rule requiring press marks to be stamped on the hoop was amended by the Government of India at the request of the Committee on the representa-

the Committee was unable to accede to the request of the International Federation

It is gratifying to note that on the whole the marking of bales in Indian States has proceeded satisfactorily. Legislation for this purpose and for the submission of weekly press returns is now in force in the following States —

Alipura, Alwar, Bahawalpur, Baroda, Barwani, Bhavnagar, Bhopal,

Weekly returns for cotton pressed were received from all the above States during the year, except Gwalior.

LICENSING OF GINNING AND PRESSING FACTORIES

15 Mention was made in last year's report of the request of the Committee to the Government of India for the amendment of the Cotton Ginning and Pressing Factories Act by the addition of a clause empowering local Governments to introduce the system of licensing ginning and pressing factories with the consent of their respective legislative councils. Such a measure it was hoped would provide an effective remedy for the various malpractices which were lowering the reputation of Indian cotton both in the country and abroad. The Government of India have since intimated their inability to undertake central legislation as desired by local Governments introducing Bombay and Central Provinces necessary legislation and it is h action taken by these Governments become apparent, other Provinces and States will not be slow in following suit. At present only the Hyderabad State has legislation of this character in force.

MALPRACTICES

16 The East India Cotton Association reported five cases of bales having been rejected as they contained watered cotton. These bales came from Hansi and Mandi Dabwali in the Punjab, Shegaon and Telhara in Berar and Navsari in the Bombay Presidency. Certified copies of entries in the press register pertaining to the bales in question were called for under Section 3 (3) of the Cotton Ginning and Pressing Factories Act and the information supplied was communicated to the East India Cotton Association.

An exporting firm in Karachi reported the rejection in Liverpool of bales of saw ginned Punjab-American cotton due to some of the bales having been badly damaged internally by water. A report was made to the Director of

practices should be avoided in future.

A complaint regarding oil spots in cotton from Bhatinda (Patiala State) received from a Bombay firm late in 1933 was reported to the Patiala State authorities. Intimation has now been received that instructions have been issued by the authorities to the effect that a warning should be administered to the factory owner.

A complaint received towards the end of 1933 from an exporting firm in Karachi regarding false packing and adulteration in bales received Dhuri (Patiala) was reported to the State authorities who recently in that a warning had been given to the press concerned.

On receipt of information last year from a cotton exporting firm result of cut throat competition factory owners, to reduce their losses to the malpractice of mixing seed with cotton at certain places in

Provinces and in Central India, reports were made to the Director of Industries Central Provinces, and the Holkar State authorities for such action as they might consider feasible. In the Central Provinces, Commissioners and Deputy Commissioners instructed their subordinates to advise cotton traders and press-owners of the evils of such practices. The Holkar State authorities propose to

cancellation of licenses for working the factory. The State also propose to carry on propaganda against such practices through the medium of cotton markets.

A complaint regarding the presence of abnormal quantities of seed in cotton from the Hyderabad State was received from a Bombay exporting firm and reported to the State authorities. This led to the issue of a circular to all ginning factories by the State drawing their attention to the serious consequences which such practices were likely to have on the prices of cotton in the

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Reports were also made to the State authorities concerning the presence of seed in cotton being imported from the districts of Nizam and Hoshangabad. The superior cottons of the Central Provinces

Rajputana cottons were found to be mixed with the Vimari and Hoshangabad cottons. On information being sent to the Central Government, it was decided to prohibit the sale of cottons whereby no cottons would be sent to the two districts. The question of legislation on

Persistent complaints regarding the presence of seed in cotton being imported from the districts of Nizam and Hoshangabad have been made to the State authorities. The State has led to the suggestion that the Central Government should report the names of the cotton dealers and to this Com-

"... and complaints were sent round to all local buyers.

BOMBAY COTTON CONTROL BILL.

17. The Committee : ...
Committee : ...
in the Surt : ...

gain with a low type of cotton having high ginning percentage known as *Goghari* grown in the same area the Local Government have decided to

1027 A L F cotton to the detriment of the cotton growers of the tract affected

COTTON MARKETS

18 The establishment of regulated cotton markets under the Bombay Cotton Markets Act has not b
the advantages of such mark
only three markets ore each
notified under the Act There appears to be some demand for regulated cotton markets at Malegaon Baramati and Dharwar and the question of opening similar markets at Surat Broach and Bijapur is also receiving the attention of the Commissioners concerned

District Local Boards and big *zamindars* in Sind do not appear to be aware of the advantages of regulated markets and propaganda to convince local opinion of the desirability of such markets would therefore seem to be necessary It has accordingly been suggested that an experimental cotton market should be established at a suitable centre either by Government or by co-operative agency in order to educate growers and to demonstrate the detailed working of a regulated cotton market

The Madras Government have finally published the Rules under the Madras Commercial Crops Markets Act
measure of success attends this pieco c
far as cotton markets are concerned co
and the Central Provinces

The question of undertaking legislation for the establishment of cotton markets in the Punjab has also been engaging the attention of the Local Government and the conclusion arrived at was that the problems of marketing required much closer study before the Local Government could attempt to embark on legislation An enquiry undertaken there revealed the existence of many evils the remedy for which the Local Government consider lay rather in the force of an enlightened and active public opinion than in the enactment of legislation

It is unfortunate that owing to protests on the part of the commercial community the Sanghi State Commercial Crops Bill which was passed by the State Assembly could not be passed into law The previous Huzur Order regulating the sale and purchase of commercial crops continues therefore to remain in force

In the Baroda State rules under the Baroda Agricultural Produce Markets Act to which reference was made in last year's report have not yet been finally framed

UNIVERSAL STANDARDS FOR INDIAN COTTONS IN INDIA

19 In accordance with the procedure detailed in last year's report the Standards Sub-Committee passed the standards for the following varieties of cotton —

<i>Bengals</i>	<i>Oonras</i>
<i>Sind</i>	<i>Mathias</i>
<i>Punjab American</i>	<i>Broach</i>
<i>Sind American</i>	<i>Dholleras</i>

The reference set of standard boxes intended for the Committee were after being placed in hermetically sealed cases sent to Bangalore for storage

STANDARDISATION OF WEIGHTS IN COTTON TRANSACTIONS

20 Last year's report contained the information that only the United Provinces and the Central Provinces Governments had accepted in full the recommendation concerning the adoption of the railway *maund* units of weights for cotton transactions. The Government of Madras had prescribed only the railway *maund* of 82½ lb and the *khandy* of 784 lb. The Bombay Government were again requested to reconsider the question of standardising the Bombay *khandy* of 784 lb but they expressed their inability to accept the Committee's recommendation owing to the divergence of views expressed by the various important commercial bodies consulted. They added however that the regulations in force in the Presidency did not debar cotton transactions in *khandies* of 784 lb provided they complied with the provisions of the Bombay Weights and Measures Act by specifying in addition the exact equivalent of *khandies* in one or other of the standard weights 112 lb, quarters, cwts, etc.

Of the five principal cotton growing States addressed in this matter Gwalior has adopted the *maund* of 82½ lb and the *khandy* of 784 lb and Baroda the *maund* of 82½ lb. In Indore the *maund* of 82½ lb is the standard and legal weight all other weights being unauthorised. The Hyderabad and Mysore States are still considering the question.

REPRESENTATION ON THE INTERNATIONAL FEDERATION OF MASTER COTTON SPINNERS AND MANUFACTURERS ASSOCIATIONS

21 In order to deal more effectively with complaints arising abroad regarding faults often of a minor nature in Indian cotton which frequently received wide publicity through the publication of the proceedings of the bodies at which they were discussed the Committee considered it desirable to obtain

if possible representation on the International Federation of Master Cotton Spinners and Manufacturers Associations Manchester. It is understood however that under the Federation's constitution the Committee is not entitled to ordinary membership and an application has accordingly been made for admission as an Associate Member. The result* is awaited.

MEANS TO PREVENT THE INTRODUCTION OF FOREIGN COTTON PESTS

22 *The Mexican Boll weevil (Anthonomus grandis)*—The restrictions imposed by the Government of India in 1925 on the import of American cotton into India continued in force without change during the year under review.

and paid to importers in April and May 1935

23 *The Red (Sudan) Boll worm (Diaphoropsis castanea) and other pests*—The restrictions placed on the import of foreign cotton seed under Government of India Notification No 1213 Agri dated the 27th May 1930 in the Department of Education Health and Lands and the entire prohibition of the import of foreign *kapas* (unginned cotton) under Government of India Notification No 897 Agri dated the 24th July 1925 remained in force throughout the year. Under these regulations two parcels of cotton seed were received for examination and fumigation during the year.

COLLECTION AND SUPPLY OF INFORMATION

24 As in the past notice on the progress made in the Provinces and Indian States work of the published by

Cotton and on the Cotton Annual

PUBLICITY AND PROPAGANDA

25 A full account of the activities of the Publicity and Propaganda Department of the Committee will be found in the Annual Report of the Publicity Officer which forms Chapter VII of this Report.

carried out in connection with the question of levying a cess to meet the cost

* Information has since been received that the Committee has been admitted to Associate Membership.

† Appendix V

of the required heating machines, their installation, working expenses, etc., should it be decided to introduce control measures. A specially designed 10 colour poster was used with much advantage during the campaign.

Seven press communiqués were issued, four of which dealt with the development of cotton growing in Sind, the Bombay Presidency, the Central Provinces and the Coimbatore District of the Madras Presidency.

In addition to the issue of special articles and pamphlets from time to time, the Department participated in the exhibitions at Nanded organised by Lal at req exhibition, for use at the day

PUBLICATIONS

26. The Committee receives partly on an exchange basis and partly by subscription a number of important scientific and technical journals which are circulated to research workers and institutions of the Committee. This

perusing varied and up to date scientific literature, which might not otherwise be available to them.

The name of the Committee is on the free mailing list of a number of private and public institutions to whom the thanks of the Committee are due. Particular mention should be made of the British Cotton Industry Research Association for its Summary of Current Literature and the Shirley Institute Memoirs, the Empire Cotton Growing Corporation, the British Cotton Growing Association, the East India Cotton Association and the Karachi Cotton

Sciences, Calcutta the Academy of Science and other Associations and Chambers of Commerce which supply it with reports, statistics and other literature from time to time. The Committee is also on the free exchange list of the Imperial Council of Agricultural Research, the Imperial Institute of Agricultural Research, Pusa, and the Director-General of Commercial Intelligence and Statistics, Calcutta.

SECRETARY'S TOURS

27. During the year under review the Secretary visited Simla, Indore (twice), Lyallpur, Lahore, Madras, Coimbatore, Perindurai, Bangalore, Irwin Canal Farm, and Hyderabad in connection with the work of the Committee.

FINANCIAL.

28 In Appendix VI will be found a statement showing the Receipts and Expenditure for the year ending 31st March 1 Rs 9,71,623 expenditure to Rs 13,57,585, the principal items of savings being under the following heads —

Administration (Rs 28,063), Improvement of Cotton Marketing (Rs 12,584), Seed Distribution and Extension Schemes (Rs 1,06,575—three schemes sanctioned were held in abeyance), Printing and Propaganda (Rs. 11,046), Technological Research (Rs 83,540), Surat Boll worm Clean up Scheme (Rs 7,000) (Rs 4,716), Defibration of cotton seed, Bomha " ras Pempheres and Physiological (Rs 21,626), (Rs 2,509), Punjab Entomological (Rs 8,910), Punjab White Fly (Rs 3,170), Punjab Physiological (Rs 15,264), Punjab Spraying Trials (Rs 2,736), Central Provinces Botanical (Rs 2,836), Sind Physiological (Rs 5,705), Hyderabad Botanical (Rs 1,185), Hyderabad Pink and Spotted Boll-worm (Rs 4,135), Bikaner Gang Canal (Rs 4,527), Baroda Root Rot (Rs 2,557) and Bengal Comilla (Rs 2,196)

At the discretion of the Finance Minister

the condition that there should be no objection to drawing on this balance in case of emergency, provided that such shortages are made good as soon as conditions improve

CHAPTER III.

STATISTICS

29 FROM its very inception fourteen years ago the Committee has evinced considerable interest in the subject of cotton statistics and this interest has been shown not only in the direction of attempting to improve as far as possible, the accuracy and form of presentation of the statistics previously available, but also in that of introducing new statistics for various phases of the cotton industry information about which was lacking. In the following paragraphs the further progress registered, or work done during the year under review alone is recorded, as space does not permit the recapitulation of past history.

30 Cc
General of crop estima simultaneous release at Bombay and Calcutta, worked satisfactorily during the year under report

These estimates showed a fall in the area of cotton in India from 24,136,000 acres in 1933-34 to 23,830,000 acres in 1934-35. The decrease was due to the unfavourable weather conditions prevailing at sowing time in Hyderabad State, which alone registered a fall in area of over half a million acres. The total estimate with 5,068,000 yield per acre, was based on the following conditions, as far as the crop

An interesting point is brought out in the area figures for each variety of cotton reported during the last five seasons. Though it cannot be said that there has been any steady decline or increase in area in the case of all other

31 The piece-meal publication of Provincial and State cotton forecasts

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... Exercise & welcome
all-India
dispenses
Journal

32 The scheme for the improvement of the cotton crop forecasts of the Bombay Presidency, sanctioned by the Committee in January 1934 for a period of two years in the first instance at an estimated total cost of Rs 11,694, completed its first year on the 15th June 1935. The investigations brought to light several sources of error in the compilation of Bombay cotton forecasts. It is particularly noteworthy that a very serious mistake, which regularly swelled the estimated yield of an Indian State by a lakh of bales was discovered and rectified during the year. In addition, the district standard yield figures which, for want of crop-cutting experiments, had not been revised for many years were examined in the light of other available statistics, and tentative revised yield figures adopted for West and East Khandesh districts, and Belgaum Bijapur and Dharwar districts. Further work is in progress. In the

33 Reference was made in last year's report to the efforts made by the Committee to obtain by local enquiries reliable estimates for the quantity of raw cotton annually used in India for such domestic purposes as hand-spinning and the making of quilts, mattresses, cordage, etc. The respective reports, except Hyderabad, submitted on the completion of these enquiries, were examined by the Cotton Forecast Improvement Sub Committee at its meeting held in August 1935. As the enquiry made in Bengal had failed to furnish the data necessary to arrive at a standard for village consumption in the non cotton growing tracts of Bengal and Bihar, the Committee deemed it advisable to conduct another enquiry in Bihar and sanctioned a sum of Rs 1,200 for this purpose.

34 It is highly gratifying to note that on the whole the subject of the improvement of the accuracy of Government cotton forecasts is receiving increasing attention at the hands of the authorities concerned, to whom an opportunity of meeting and discussing their problems is afforded by the half-yearly meetings of the Cotton Forecast Improvement Sub-Committee

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tentatively
Presidency

proper has already been referred to. In British Punjab, crop cutting experiments are under way on a more extensive scale than before. Failing to get from the Punjab States an adequate response to the suggestion made to them for revising their estimates of yield, it has been decided to make use of the figures for cotton pressed for the purpose of estimating the crop of such States. The Central Provinces and Berar have advanced a step further in the collection of complete and reliable statistics to check the accuracy of their forecasts. Arrangements have been made from the commencement of the season 1935-36 to obtain from factories a weekly statement showing the quantity of cotton ginned together with information regarding its origin. Likewise monthly returns have now been arranged for, from every custom station on the borders of Hyderabad State, with a view to finding out the

quantities of *kafas* unpressed cotton and pressed cotton that are exported from each district in the State to each of the adjoining British districts. The question of the revision of the standard yield figures of Mysore State is also being examined by the Revenue Commissioner of the State.

35 As in the previous year a report on the estimated production during the season of Indian cotton of different staples was issued in May. With the ungrudging co-operation of the Agricultural Departments it was possible to give in this report more detailed information than had been possible before. Not only were the chief fibre characteristics of the different growths given but also the civil districts in which they were grown were specified. The criticisms received on this report show that the attempt is being appreciated by the trade and industry though the report is likely to be more useful to them by the introduction of a few more innovations in it. One suggestion received and already accepted by the Committee is that trade estimates of the crop should be given side by side with the Government estimates and an attempt will be made to give effect to this suggestion in the report to be published in May 1936 although owing to the dissimilar bases on which the two estimates are prepared the likelihood of reconciliation would appear to be somewhat remote.

36 *Press Statistics*—Ever since the ~~Press Statistics~~ Press Factories Act in 1925 all furnishing weekly returns of cotton collated by provincial authorities.

States had to be individually approached for necessary legislation providing *inter alia* for the establishment of press statistcs. The Committee is gratified to be able to report now that its efforts have not been in vain and that all States addressed have fallen into line with British India in this matter the last of them—Gwalior—having signified its intention of compiling press returns from the current season.

The returns of cotton pressed during the season 1934-35 show that 3 444 781 bales were pressed in British India and 1 169 820 bales in Indian States making a total of 4 614 601 bales for the whole of India the corresponding figures for the preceding season being 4 015 516 bales 1 286 317 bales and 5 331 833 bales respectively.

37
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however only be bridged if the press statistics referred to in the preceding paragraph are supplemented with information regarding the quantities of loose cotton (ginned but unpressed) taken directly into mills or used for

domestic consumption or for exports. In 1925, the Committee therefore brought to the notice of provincial authorities in the Punjab, the United Provinces, the Central Provinces and Berar, and Bombay the desirability of collecting these statistics from mills on a voluntary basis. They readily agreed and the figures relating to loose cotton received at mills in the major cotton growing provinces of British India are being compiled and published since 1926 (*vide Appendix VII*). It will be seen from these figures that mills situated in cotton growing tracts take considerable quantities of raw cotton in loose unpressed form.

In view, however, of the fact that the information now available is not complete even for the provinces for which they are collected, the Committee at its meeting held in August 1935 decided to recommend to the Government of India to amend the Rules under the Indian Cotton Cess Act by providing for the desired information to be shown in the monthly returns furnished by mills under the Act. Should the proposal be accepted, it is hoped that, with the co-operation of Indian States, the necessary figures would, before long, be available for the whole of India.

38 Consumption —The compilation and publication of the monthly statements* (1) of Indian cotton consumed in British Indian mills, (2) of Indian cotton consumed in mills in Indian States, and (3) a consolidated statement of (1) and (2) specially meant for publication in the daily Press were continued. For the first time in the history of the Indian mill industry the consumption of Indian cotton in India exceeded the limit of 2½ million bales and registered the record consumption of 2,612,132 bales against the previous record of 2,373,094 bales in 1929-30. Much of this rise is due to the substantial recovery of Bombay Island which is by far the largest consuming centre of Indian cotton.

The world's total consumption of Indian cotton too, increased from 4,772,000 bales in the previous year to 5,599,000 bales in the year ending 31st July 1935.

39 Exports —The exports of Indian cotton during the season 1934-35 were 3,115,420 bales of 400 lb as compared with 3,269,000 bales in the previous year.

40 Stocks —Accurate and reliable information regarding the stocks of raw cotton left in the country at the end of each season is as important to the cotton trade as it is to those on whom falls the task of checking forecasted production of raw cotton with the actuals accounted for at the close of the season. Except for the stocks held by the trade and the mills in Bombay this information had been lacking till 1933, when the Committee took this matter up and set to work to enlist the co-operation of various trade bodies, mills and cotton market committees in collecting the desired information. In the short period that has elapsed since this question was first taken up a considerable

part of the field has been covered, and it is hoped that, with an increasing appreciation of the usefulness of these statistics they will in due course be made more reliable and complete.

The information collected with regard to the stocks held on the 31st August 1935 is contained in *Appendix VIII*.

It may be mentioned here that for the very late crops, viz., Salems, Cambodias and Tinnevellies of the Madras Presidency, the season for which is taken to be the year ending 31st January, the Director of Agriculture, — — — — — collect every year the stocks held on the s, and by mills in the whole ted under this arrangement is given in *Appendix VIII*.

41 *Demand for various types of Indian cotton*—Another useful line of enquiry undertaken by the Committee is the Indian mill and export demand for the various types of Indian cotton. In the changing conditions of the world, extent of the demand from year to year.

The Statistical Leaflets Nos 3 and 4 (second issues) giving the results of the inquiry into exports and receipts at mills in 1934-35 are reproduced in Appendices IX and X.

41A *Publications*—The following publications were issued during the year under report—

- (1) *Statistical Leaflet No 1 (Second Issue)*—"Report on the Staple Length of the Indian Cotton Crop of 1934-35 Season"
- (2) *Statistical Leaflet No 2*—"Stocks of Indian Raw Cotton held in India by the Mills and the Trade on 31st August 1934"
- (3) *Statistical Leaflet No 3*—"Receipts at Mills in India of Raw Cotton classified by Varieties—1933-34 Season"
- (4) *Statistical Leaflet No 4*—"Exports by Sea of Indian Raw Cotton classified by Varieties—1933-34 Season"
- (5) *Sta* "the Various

The last publication is an attempt, the first of its kind ever made to examine the supply and distribution of the various types of Indian cotton in the different publications. Thanks are due to those who kindly examined

CHAPTER IV.

RESEARCH

42 WITH the passing of the Cotton Cess Act in 1923, the Indian Central Cotton Committee was provided with funds for "the improvement and development of the growing, marketing and manufacture of cotton in India" The Committee carries out these objects by the establishment and direct control of the Technological Laboratory at Matunga, Bombay, and by offering subsidies to Departments of Agriculture and Co-operative Sale Societies in provinces and States for the investigation of some specific problems of economic importance and for the extension and marketing of improved types of cotton produced either by Departments of Agriculture or by the research financed by the Committee In addition the Committee contributes annually a large sum of money to the Institute of Plant Industry, Indore, which is a central research station for cotton in the black cotton soils of Central India, The problems dealt with in provinces and States include many research schemes of more than local importance, viz.,
types of cotton by selection and hybridisation
of crop growth bud and boll shedding a

Imperial Council of Agricultural Research the economic enquiry into the cost of the cultivation of cotton sugar cane and their rotation crops in the principal cotton and sugar-cane growing areas of India All research and seed extension and marketing schemes are, as they are received from the Directors of Agricultural Departments, first examined and approved by the Agricultural Research Sub-Committee before they are finally sanctioned by the Committee which keeps itself in close touch with the progress of their

funds during the year ending with the 31st March 1935, amounting to Rs 6,44,006 [for research and seed distribution and marketing schemes in addition to the sum of Rs 4 92,328 sanctioned to the Technological

graduate training in India and abroad in subjects pertaining to cotton industry

TECHNOLOGICAL LABORATORY

43 The Annual Report of the Director, Technological Laboratory, forms Chapter VI of this report and it may be referred to for details The work of the Laboratory, particularly of the spinning and yarn testing sections,

suffered to some extent during the year owing to the necessity of slowing down the processing of samples for over six weeks in order to allow the extensions to the spinning and yarn testing block and the replacement of some of the old blow-room machines with new up-to-date machines. This accounts for the decline in the number of samples and lots spun during the year as compared with last year. The samples tested during the year fell, as usual, under four classes, viz., (a) agricultural samples, (b) samples of standard Indian cottons, (c) Trade samples and (d) Technological samples. The agricultural samples represent mostly new strains which are still in experimental stage and some old types grown in connection with certain field experiments undertaken by agricultural officers in provinces and States. Of these experiments special mention might be made of the tests on 38F, 43F, Boss III and Sea Island cottons and on the effect of differential irrigation upon the fibre properties and spinning quality of cotton. The standard cottons consist of certain improved varieties which are now being grown on 15 per cent of

Umri Bant, I.. They include *Punjab-American*

289F, Punjab.. *27 A L F., Gadag*

1 (Dharwar-American), Cambodia Co 2, Sind Suanar, Sind N R, V 43 $\frac{1}{2}$, and Late Verum, and the results of the first nine types were published during the year in four-page circulars. The trade samples represent (a) the main types of commercial cotton which form the bulk of the Indian cotton crop and (b) the first arrivals of the new crop of cotton of a season. The object of these tests is to obtain information on the trade and mill industry regarding the

these cottons During the year 1927 20 samples for the

industry were tested and the results were published in 2-3 page circulars as usual. In addition to these tests the Laboratory undertakes on payment of certain fees laid down by the Committee tests on samples supplied by individual mills and firms in their private capacity and 39 such samples were

The experiment started during

staple cotton, bales pressed to ~~100 lb~~ ^{100 lb} of 289F, 1027 A L F., Jayawant and Cambodia

course

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at Karachi was completed and the

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and both in grade and spinning quality. The technological

high draft tests, ~~etc.~~ of storage on seed cotton prior to ginn cottons and comparative tests on the machinery

The moisture testing section continued the tests on the moisture content of Indian cotton received in Bombay and in view of the adequate data obtained on these tests during the past three years a final report containing all the results was written up and submitted to the East India Cotton Association

INSTITUTE OF PLANT INDUSTRY INDORE

44 The Annual Report for 1934-35 of the Director Institute of Plant Industry
 may be referred to for the
 Institute was opened in 1924
 cotton in the black soils
 grants contributed by the

"
 Indian Central Cotton Committee and some of the States in Central India and Rajputana. The programme of the Institute includes the general botany physiology and genetics of cotton in addition to a number of agricultural investigations relating to the cultivation of cotton and other crops. As decided last year a beginning was made for the general distribution of the two new types of desi cotton *Malvi 1* and *Malvi 9* which have been found to yield 20 per cent more than the local mixture *Malvi 9* the better of the two is superior to local by 4 to 6 per cent in ginning and about 40 per cent in spinning. It has also been discovered in the course of the study of genetic variance in cottons that further improvement is possible in both *Malvi 1* and *Malvi 9* and that the latter is capable of greater improvement. *Cambodia* as compared with *desi* has been found a poor yielder on all soils in Central India with the possible exception of a few areas under tank irrigation and it does not therefore appear to have any future in Malwa unless it fetches a premium of 60 per cent. Experiments have been laid out for definitely ascertaining whether *Upland American* can hold its own against *Desi* in Malwa and if so by what means. The data obtained from the botanical survey of cottons in Malwa and Nimar reveal very interesting and important differences in survival value of different types and physiological work is being undertaken to find out the causes of the differences in plant response. The study of hybrids between *G. Africanum* and cultivated Asiatic cottons has shown that the normal chromosome compliment of all plants so far studied is 26 but a few plants contain small islands of tetraploid tissue. Root studies on wilt have confirmed the indications obtained last year that the presence of

in the first one foot below the surface have been found higher than around healthy plants. This is evidently due to the change in the physical condition of soil brought about by affected plants and the influence of this change on the aeration and activity of roots is obvious. The application of organic manures improves the nitrogen

GRANTS-IN-AID-

SCHEMES IN PROGRESS IN PROVINCES AND STATES.
MADRAS PRESIDENCY.

45 The Herbaceum Scheme was first started in 1923 with the object of securing from local *Uppam* (*G. herbaceum*) suitable types equal to *Karunganni* (*G. indicum*) in yield and spinning quality when grown under usual rain-fed conditions in Salem and Coimbatore districts where rainfall is low and often precarious. In years of good rainfall *Karunganni* gives a much higher yield than *Uppam*, while in bad years the position is reversed, *Uppam* being a harder variety, capable of giving a fair yield even in adverse seasons. The cultivator meets the situation by growing a mixture of the two varieties. The *Karunganni* was,

pure strains from *Uppam* that could spin above 20's were few and it was therefore decided in 1930 to secure by hybridisation what was found impracticable by pure line selection. The new line of work has now given some valuable results which are likely to prove to be of considerable economic importance. Two of the selections, 112, 4714 and 4801, from a cross between *indicum cernuum* and *obtusifolium* have not only proved to be pure for seed and lint characters but have given in comparative tests much better yields than all other strains with which they were compared. Selection 4714, the better

object, provided it behaves in years of good rains in the same way as it did this year of insufficient rainfall. A few inter-varietal and inter-specific crosses have been back-crossed to both the parental types with a view to exploit the new technique of back-crossing. Some of the plants grown of X rayed *Uppam* seed have developed some interesting peculiarities which will be studied next year.

... by the Cotton Specialist at Coimbatore. But due to the difficulty of securing the services of a competent plant physiologist the scheme had to be held in abeyance till 1930 when it was decided that two officers from the Madras Agricultural

work under the supervision of the Cotton Specialist. The scheme commenced formally in September 1931 when Messrs T R Narayana Iyer and S Kasinath Iyer were sent for training in plant physiology and biochemistry respectively. On their return after training the scheme was reviewed in February 1935 when it was decided to restrict its scope to the reduction of the shedding of flowers buds and bolls in *Karunganni* caused by untimely rains by breeding and physiological methods and devising control measures against the cotton stem borer. From the investigations carried out in 1933-34 it was noticed that the actual loss due to pemppheres was only 4 per cent but the results obtained from the repetition of the same experiment during the year under report show that assuming the incidence of attack as 100 per cent the loss sustained in yield amounts to nearly 50 per cent — 20 per cent due to the death and the rest to the poor yield of affected plants. The eight American varieties *Gadag Bourbon Co 2 Buganda 9355 Durango Buri* and *U 4* which were tested during the year were found equally susceptible to the attack though they slightly differed in their resistance. A few crosses between *Co 2* and some South American types which were found resistant to the attack have been re-crossed with *Co 2* with a view to obtaining resistant types. On the chemical side the regeneration of the tissue of the affected plant is confined only to a third of the larval gallery and is not begun till the pest is at least a fortnight old. It is however interesting to note that Peruvian cotton gums up so rapidly after the attack that insect responsible for the damage die out quickly. Three parasites a Braconoid and two kinds of Chalcids were observed attacking the borer in its grub stage but their damage did not exceed 1 per cent. The incidence of the pest was found considerably low in localities where the close period of cotton is longer than three months and also when sowings were put off by about three weeks in September the crop was free from the pest till January showing thereby that the pest could be easily brought under control if no cotton plants are left in fields for over three months between the harvest of the old crop and the sowing of the next crop of cotton. The preliminary investigations into the shedding of flowers buds and bolls indicate that boll retention is higher in *Karunganni* types than in *Uppam* and that cotton when mixed with black gram has less shedding than when it was sown pure.

47. *The Fodder Cholam Scheme* commenced in January 1931 with a view to ascertain the causes of the compared with *Cumbu (Pen* cotton in the Tinnevelly dis

The work of the year under report was more or less a repetition of what had been done in previous years except that two new experiments were added:

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the exception of the one experiment on base exchange no other experiment gave any decisive result though the general trend was in the direction already indicated in previous years. The study of base exchange shows that while there is little difference between *Cholam* and *Cumbu* soils in the first layer

of six inches, the second and third six inch layers of *cholam* soils contain a

noticed, and a knowledge of the processes which bring out this change may prove very helpful in devising suitable ameliorative measures. *Cholam* does not appear to exhaust the soil fertility any more than *Cumbu* and neither deep ploughing nor the application of humus in the shape of sunhemp compost had any effect on *cholam* soils as could be seen from the low yields of succeeding cotton. The conclusion arrived at in previous years that, while *cholam*, when allowed to run into seed, seriously affected the yield of succeeding cotton, no such adverse effect was observed when it was cut at shot blade stage was

growing, by thick sowing, by growing a mixture of *cholam* and one or more suitable pulse crops, by preventing *Cholam* plants from running into seed by cutting ear heads at the flowering stage and other means.

48 The Nadam Cotton Breeding Scheme, which commenced in February

for the stem-weevil and pink boll-worm during the close period of Cambodia
recommended by the Madras P.D. + Act and for one or two months before these
er Salem and
to Cambodia

cotton The work of the year under report shows that there is a good prospect of securing an annual type which can replace *Nadam*. The season was very unfavourable with a low rainfall of 21 inches against an average of 30 inches. Sowings had to be delayed till the third week of October for want of timely rains and the total rainfall received throughout the growing period of cotton was only 4.35 inches. Even under these adverse conditions, three cultures of *Nadam*, nine of F3 crosses of *Nadam* and *Karungann*; and thirty F3 and F4 crosses of *Cambodia* and *U4* were expected to yield about 200 lb of kapas per acre against about 80 lb of *Nadam* in the second year when highest

BOMBAY PRESIDENCY

percentage of Goghs, a rough and short staple variety susceptible to wilt but

with a high ginning outturn up to 40 per cent. In view, however, of the recent

four crosses, viz., (1) *B D 8* 26-II back crossed to *B L* generation) and (4) *B D 8*. Of the 66 families belonging to *B D 8* 26-II back crossed to *B L* (second generation) and (4) *B D 8* I in detail free from wilt, seven with 1 to 5 per cent attack and in the rest the attack varied from 6 to 100.

during the year, 66 plants with 35 to 42 per cent ginning outturn and fibre length of 20 to 23 mm have been retained for further tests. Cross No 3 is a little susceptible to wilt but has good staple and medium ginning outturn. Forty-three plants of this cross with 35 and above ginning percentage and staple length of 20 to 23 mm have been selected for further study next year. Cross No 4 resembles *B D 8* a long staple variety with low ginning percentage, in height *N S 12* I in fruiting and bearing. Its ginning two parents. Fresh crosses have been made (*i*) and (*ii*) *B D 8* and *N S 12*. Of the single line selections, *N S 12* has again proved satisfactory for wilt-resistance and other economic characters.

In the *T 1* line cotton breeding scheme, *N V 56* and *N V 57* have been included in the Research scheme.

N V 56 and *N V 57* are both *N R* in ginning outturn, resistant to wilt and has considerably higher yield than *Banilla*. They were first introduced in 1934. The *N V 56* which looked

promising last year, were again found this year better yielders than *Banilla* and *N R 6* and did not suffer from the bad effects of continuous rains after sowing. They are also wilt-resistant and much superior to *Banilla* in fibre length. One of them, *N V 57-7*, is typically sympodial and matures earlier than the other two selections but it is slightly inferior in ginning percentage.

51 *The Scheme for Survey of Goghar Cotton in Gujarat* is a necessary corollary to the Committee's policy of encouraging exclusively the cultivation of *1027 A LF* in the tract lying south of the Nerbudda in Gujarat and to the seed scheme sanctioned in August 1934 for the extension of this cotton. The scheme has for its object the field survey of *Goghar*, an inferior short staple

wide distribution of *Goghar* either as pure or mixed crop. Gin-owners failed

to co-operate with the Department of Agriculture and it is intended to approach them once again next year through the Gujarat Divisional Cotton Committee and the First India Cotton Association Bombay

52 Plant Puller Propaganda Scheme in Surat and Broach Districts—This scheme is the natural consequence of the Surat Boll worm Clean up Scheme

of the food material till the next crop of cotton. The clean up scheme was a success and the culprits were arrested. The clean up measures the culprits and on the termination of this scheme the first instance for one

season of 6 months
the cotton plants will be pulled by public labour

result of this activity the Department of Agriculture could distribute in the North of the Nerbudda 1 282 plant pullers in addition to another 2 158 pullers sold by local merchants. In the south of the Nerbudda the demand for plant pullers was much greater and the Department of Agriculture could not obtain for this tract more than 1 636 pullers which were disposed of very quickly.

80 per cent in Broach 90 per cent in
10 per cent in Jambusar Talukas in the

rest of the total area under cotton in the

able area was thus left untouched due

mainly to the new leases being delayed so late in the season that the incoming tenants have no time to pull out cotton stalks in time. To avoid this difficulty it is hoped that by the time the scheme terminates in June 1936

53 The Scheme for Desibration of Cotton Seed was sanctioned in August 1934. A desibration machine has since been purchased and installed at Palej, Broach district and the machine will commence work in January 1936.

SINDH

The work of the year under report is mainly a repetition of what was done during the last year and the results obtained are in conformity with those of

of 2 75" each at 15 days interval and 5 irrigations of 2 75" each of 10 days

Interval gives the highest yield. The manuriel experiments also have given

old or in two equal doses, one when the crop is $1\frac{1}{2}$ months old and the second two months later. Observations on 'red leaf' were continued. The experiments for finding out the optimum time for sowing were not repeated in view of the definite conclusions already arrived at.

PUNJAB.

55. *Botanical Scheme* —The chief object of this scheme when it was sanctioned in 1925 was to investigate into the causes of the periodic failures of American cotton in the Canal Colonies where a very large area is annually under this cotton and to obtain suitable types of American and *Desi* cottons to replace *4F* and *desi* cottons respectively. Efforts are, however, being concentrated from the beginning on the problem of breeding new types in view of their immediate economic importance and as will be seen below a separate

36F, 38F,

limate, the

Department of Agriculture had decided to continue for one more year comparative tests between *43F* and *38F*, the two most outstanding strains,

parts of the province. Three other American strains, *54F*, *55F* and *58F*, have given promising results and they will be tested extensively in 1935-36. The *desi* type No. 39 which was issued last year for distribution has been spreading satisfactorily and two other *desi* strains are under severe tests.

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of Americ

57. *Pink and Spotted Boll-worm Scheme* —In January 1926, the Committee sanctioned a Pink Boll-worm Scheme for the investigation of the causes responsible for the difference in the incidence of the pink boll-worm between South-East Punjab where its attack is severe and the Canal Colonies where it is negligible. The scheme came to an end in March 1934 when it was superseded by the present Pink and Spotted Boll-worm Scheme for the continuation of the work on pink boll-worm and the enquiry of certain aspects of the spotted boll-worm. The results obtained from the Pink Boll-worm Scheme have been given in previous reports and it will be seen from them that temperature and humidity are the main causes of the unequal distribution of the insect in the two areas. The work of the year indicates that the attack of the spotted

boll-worm is more severe in the Central Provinces than in the rest of the province where the pest was first observed. During the year under report the spotted boll-worm was first observed in the middle of June when the new crop was sown. It fed on the tender shoots till about the beginning of September when it commenced attacking flower buds and green bolls. Its damage, as was observed from the experiments of night caging, amounted to 47 per cent in the case of *4F* and 65 per cent in the case of *desi*. The degree of attack varied with the types of cotton and the time of sowing. In the Punjab there is a close period of cotton

etc. It is, however, interesting that for about six weeks of this period the only host plants available are the sprouts of cotton stumps and by removing them in time it may be possible to control the pest effectively. It is therefore proposed to start soon clean-up experiments over an area of not less than 150 square miles on the lines conducted in the Surat tract of the Bombay Presidency. Five parasites of the spotted boll-worm, viz., *Microbracon lefroyi*, *Malachius nurses*, *Rhogus testaceus*, *Elasmus sp* and *Chalcos trachardiace*, were observed at Rhotak and Lyallpur and from the data collected it is noticed that a temperature in the neighbourhood of 82°F is optimum for the increase of *M. lefroyi*; while above 95°F and below 65°F no development of the insect takes place. The duration of the total life cycle of this parasite which attacks both spotted and pink boll-worms varies from 7 to 51 days. Work on the other four parasites is in progress.

58 White Fly Scheme—White Fly (*Bemisia gossypiperda*) is a small sucking insect that does damage to cotton and other crops and was first observed at the British Cotton Growing Association's estate, Khanewal. In 1929 one of the Committee's scholars was deputed to study the insect and in 1930 the Committee felt convinced of the necessity of a more thorough investigation and sanctioned the White Fly Scheme which commenced in May 1931. During the year under report the white fly infestation was unusually low. As

the crop appeared to recover more or less completely it was, however,

August gave the lowest ginning percentage and the lowest seed weight

respectively. The infestation was the lowest when the soil was treated with iron sulphate, but this treatment decreased, irrespective of the degree of attack, boll formation and ginning. Infestation was comparative sulphate were applied as manure, higher

hail shedding and ammonium mation, higher

They had also very beneficial effect on soils towards the end of June and to

No relation seems to exist between the

degree of infestation and the percentage of water content in the leaf except that *Mollisoni*, which contains the least amount of moisture, suffered the most. Irrigation experiments have, however, confirmed the previous indication that the attack is more or less in inverse proportion to the quantity of water applied to the crop. Observations were continued on the incidence of the pest on different host plants during the different parts of the year and the data obtained confirm the results of the last year.

59. *The Punjab Spraying Trials Scheme* is the outcome of the White Fly Scheme which has given a definite indication of the efficacy of certain insecticides against the white fly pest without causing any material damage to the cotton crop. The results of sprayings on small areas were misleading as the insect could fly to areas and it was therefore

indications obtained present scheme with the object of ascertaining (a) and the proper time for spraying or dusting and (b) the various methods and appliances for

given in last year's report. The trials were repeated during the year under report over an area of 2,640 acres at Khanewal, Okara and Sargodha. The insect proper time white fly attack.

American varieties are equally susceptible to this disease which is rapidly spreading in all irrigated areas of the Punjab and contrary to the indications obtained last year the incidence of the disease on irrigated cotton does not appear to have any relation to the number of irrigations. The disease appears to be less severe on cotton sown in the middle of June than on cotton sown earlier and neither *desi* nor American varieties suffered much when they were grown under rain-fed conditions. Root Rot, as explained in previous reports, is caused by two species of *Rhizoctonia*. Their attack is more virulent when

they act together than when only either of them is present and their activity is increased by the presence of subsidiary fungi (*Fusarium sp*, *Helminthosporium sp*, *Alternaria sp*) though they are by themselves harmless. The two causal organisms are most active at 35°C and their parasitic activity declines with the fall in temperature. The thermal death point of both the resisting bodies and mycelia of the two organisms is also about the same. The disease, as observed during the year, is carried over from year to year on live cotton roots in the soil.

CENTRAL PROVINCES

61. *Botanical Scheme*—This is one of the oldest schemes sanctioned in 1923 and has for its fine spinning types of Provinces and Berar

This new variety soon became so popular with the cultivator, because of its high yield and the good premium paid for it at the sale in 1929 of the necessity of sar help of which the Department

prolific and superior in lint qualities besides being drought resistant and proved a great success during the year on an area of 2,000 acres under a wide range of conditions. It gave an average yield of 635 lb of kapas (seed cotton) per acre on the Al

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respectively

1935-36 season

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was grown during the year on an area of about 16,000 acres and the results obtained were so satisfactory that it is expected to cover about 100,000 acres in the next season. V. 438 was extensively tested for its suitability for soils of lighter descriptions and the results were quite encouraging. Steps have been taken to extend this cotton on areas for which it has been developed. The scheme has yielded several other strains of distinct promise which require further testing.

62. *The Entomological Scheme* was commenced in June 1934 for a preliminary survey of the cotton boll-worm pest in the Central Provinces and Berar

where it has been doing considerable damage to cotton, with a view to ascertain its incidence, method of carry-over from year to year and the extent to which the results obtained from the Surat Entomological Scheme could be usefully applied in this province. The work of the year shows the presence of a much larger population of boll-worms at Akola : climate and higher c

these centres the spotted boll-worm starts its attack on tender shoots when the crop is 3 to 4 weeks old and causes much damage to flower buds and green bolls from September onwards. The pink boll-worm, on the other hand, does not make its appearance till about September and its damage is negligible till the latter part of December by which time nearly 85 per cent of the crop is harvested. The pink boll-worm is not thus a serious pest in the Central Provinces and Berar though the combined effect of the two boll-worms is very severe towards the end of the season. The total loss due to the pink and spotted boll-worms is estimated, from the results of night caging experiments, at 51 per cent of the crop harvested. In addition only 77 per cent of cotton harvested is undamaged and of the rest, 20 per cent is made up of half eaten seed, the remaining 3 per cent being rendered useless. The spotted boll-worm is carried over from season to season by cotton plants left over in fields after harvest, tender shoots sprouted from cotton stubbles after hot weather showers, perennial cotton trees and several malvaceous plants. The method of carry-over of the spotted boll-worm is thus practically identical in the Central Provinces and Berar and the Surat tract of the Bombay Presidency where this pest was studied in detail for 8 years from 1923 to 1931. This shows that the only possible practical remedy for the spotted boll-worm lies in clearing up immediately after harvest of all cotton stalks and stubbles and the eradication of other malvaceous plants that harbour the insect. The pink boll-worm lives during the off-season in cotton plants left over after harvest, perennial cotton trees, unginned cotton, stacks of cotton stalks and soil cracks in fields.

UNITED PROVINCES.

63. *The Cotton Survey Scheme* was started in July 1933 for the detailed survey of the to facilitate growing area

were collected from as many as 1,852 villages in Rohilkhand and the best 396 of them were tested in 1934-35 for purity. Most of these samples were found to be crosses and were therefore discarded. From the few samples that appeared to be pure 443 plants were selected and examined for all i be further tested during the year obtained from 1,101

communication was good and the Department of Agriculture had distributed pure seed. It was also observed that in places far away from towns and regular markets the crop on the whole was more homogeneous and better in staple than in other localities. Better types of cotton were seen growing in Mohoba Tehsil of Hamirpur district, Lauri Tehsil of Chaterpur State, Moth Tehsil of Jhansi district and Tchrauli Tehsil of Orchha State.

BURMA

61 *Cotton Improvement Scheme*—The local practices of dry cultivation in Burma are still so unsatisfactory that unless the cultivator is first taught the better methods of cotton cultivation there is little advantage of the distribution of the improved strains of cotton which the Department of Agriculture have been able to secure. The main object of the scheme is therefore to bring into general agricultural practice the up-to-date methods of cultivation by means of demonstration holdings in suitable centres and the scheme commenced in April 1931. The work of the year continued on the same lines as in previous

district and 311 increased from

large number of cultivators round about the demonstration holdings have adopted several improved methods such as the layout of fields, bullock cultivation, conservation of manure etc.

HYDERABAD

65 *Botanical Research Scheme*—Hyderabad is the third biggest cotton

ir have again
the control

appears to be most promising though it is slightly inferior to the rest in ginning percentage and to Gaorani 6 in spinning value. It has staple over $\frac{7}{8}$ " long suitable for spinning up to 3 $\frac{1}{2}$ s. Gaorani 4 and the next best strain Gaorani 6 have also given very encouraging results in district trials and it is proposed to distribute their seed in the next season for about 1000 and 600 acres respectively. In another set of comparative tests between Gaorani 9,

Gaoran 12, Parbhani 9, Havri 3 and *Parbhani local*, only one strain *Havri 3*, a *roseum* type, came up to the level of *Parbhani local* in yield. *Havri 3* and *Parbhani 9*, a *Banilla* type, gave higher ginning percentage while *Gaoran 9* and *Gaoran 12* had longer staple length than the rest. There were two other sets of preliminary comparative tests for the latest strains. Eight of these strains from one set and six from the other have been selected for further trials. Purity tests were as usual continued.

66 *The Cotton Survey Scheme* is a natural consequence of the above scheme and has for its object a detailed survey of the cottons grown in Hyderabad as an essential preliminary for the selection of suitable strains of cotton. It commenced in June 1931. During the year under report, 207 samples of cotton—119 of *Kharif* and 88 of *Rabi*—Medak, Nizamabad, Raichur, Karimnagar, districts and an examination of these Parbhani and Rudroor Farms, has shown crop grown in all the above districts co and *G hirsutum* with 1 to 8 per cent of *obtusifolium* var *Cocanada* and the *Rabi* type of *G indicum*. The analysis of districts the bulk in with *G indicum* 15 per cent in the

third	1	"
50 to 9	1	"
other 1	1	"
.....	1	"

grown as the *Rabi* crop. The above analysis of the *Kharif* and *Rabi* crop agrees more or less with the results of the survey of standing crop carried out during the year in 147 villages of all the above mentioned districts.

67 *Pink and Spotted Boll-worm Scheme*—This scheme is the outcome of the work done by the Cotton Research Committee. In view of the information the Committee felt convinced of the necessity of starting a detailed enquiry of these pests and sanctioned the scheme which commenced in June 1933 for finding out (a) the actual amount of damage done by them to cotton in the Godavary Valley, (b) the progress of their attack on the growing crop, (c) the mode of their carry-over from season to season and (d) the effect of the likely control measures. The work of the year shows that the spotted boll-worm season on cotton the pink boll worm when all cotton rotation crop the

two boll-worms are seen having passed over to the new cotton crop. In September and October the spotted boll worm increases in numbers at a much quicker rate than the pink boll worm but from November onwards the latter

outstrips the former. The maximum incidence of the attack of the spotted boll worm is attained in about the middle of December when it commences to decline till about the middle of February when it again starts increasing. The pink boll worm pest on the other hand reaches its maximum in January, February and begins to decrease thereafter till it becomes negligible at the end of April. The combined average maximum intensity of attack of the two boll worms for any one week during the year was 21 per cent on flower buds, 57 per cent on flowers and 58 per cent on green bolls, the actual average loss of yield for the whole season being 18 per cent. It has been ascertained that due to the local practice of renewing the leases of cultivated fields every year over 13 per cent of the area sown to cotton in the Godavary Valley remains uncultivated till about June and even later and the cotton plants of the previous season left remaining in the uncultivated area serve as a breeding ground for the pink and spotted boll worms during the close period. The spotted boll worm is seen breeding on other host plants which do not serve as any part in the carry over of the pink boll worm. The two

In Hyderabad unlike in other parts of the state the pink boll worm probably due to severe summer heat

BARODA

68. The Root Rot Scheme commenced in February 1932 for the purpose of combating root rot disease and breeding root rot resistant strains with high

organisms as were observed in *C. sativa* and *C. ussuriicum*. The same last year in the same *Phaseolus* and *Phaseolus vulgaris* species of nematodes and *Cebollobus* was so observed again in the roots of several varieties of cotton. *Rhizoctonia* is found in root rot disease. *Rhizoctonia* is found to enter cotton roots through the injuries caused by the nematodes. Other organisms present are des have been traced up to two feet below

the soil surface but *Rhizoctonia* is most common at 30 per cent humidity. Cotton is sown by the aid of thermal death point for the *Sclerotinia* of *Rhizoctonia* is 60°C which is

Karkhadai and two pure strains of cottons more tolerant to root rot than other cottons grown in Gujarat. A few selections

have been made from some pure types and they will be further examined in the next season.

69. *Goghari Cotton Survey Scheme*.—This scheme which is similar to the *Goghari* cotton survey scheme in the Bombay Presidency was sanctioned in while 10 per cent *Goghari* mixture

BIKANER.

70. *T*
of cotton
problems.

definitely indicate that under the present agricultural conditions Cawnpore 520 (*desi* type) is best suited to the Gang Canal area and a beginning has been made to multiply this seed for general distribution. *Cawnpore 520* gives the

while it responds favourably to green manuring.

CHAPTER V.

SEED DISTRIBUTION SCHEMES

71 THE Indian Central Cotton Committee felt convinced in 1929 that botanical and other research on cotton was of little consequence unless the results were made easily available to the cultivator and adopted accordingly the policy of helping the Departments of Agriculture and Co-operative Sale Societies in wider distribution of pure seed of the improved varieties of cotton Sixteen seed schemes have since been sanctioned Thirteen of them including the United Provinces C 402 Scheme which was started only in May 1935, are now under operation and one scheme for the sale of all farm crop produce in the Punjab was withdrawn during the year The remaining two schemes *viz*, Bilhongal and Haveri have not yet been commenced for one reason or other though they were sanctioned as far back as in November 1929

MADRAS PRESIDENCY

72 *Tiruppur Co 2 (Cambodia) Seed Extension Scheme*—The Committee sanctioned in 1929 a small scheme the Madras (Tiruppur) Seed Extension Scheme providing the pay of an officer to act as an advisor to a group of Co-operative Societies in Coimbatore District which had been interested in the distribution of Co 2 seed and the scheme started in May 1931 It was amalgamated in 1933 with a new seed scheme, Tiruppur Co 2 (Cambodia) Seed Extension Scheme sanctioned in August 1932 for the distribution of Co 2 seed in Salem and Coimbatore districts through the agencies of the Agricultural Department and the Tiruppur Co-operative Trading Society The Department of Agriculture with the help of the Committee's grants arranges

6 000 acres while the Tiruppur to gin pure all the seed cotton he seed to cultivators for about n guaranteed its actual loss on

seed transactions upto a maximum of 10 per cent of the capital invested for the purchase of seed and interest thereon at 5 per cent The Department of Agriculture arranged during the year a seed farm area of 4 122 acres which yielded 1 106 700 lb pure seed About a third of this quantity had to be discarded as it was found unfit for sowing and the rest was distributed for an area of about 29 600 acres

73 *The H1 (G herbaceum) Seed Extension Scheme* has been suspended due to the difficulty of securing local co-operation in the supply of improved seed in the Bellary district The question of a revised scheme is under consideration.

BOMBAY PRESIDENCY

74 *Hibis Seed Extension Scheme*—The main object of this scheme which came into operation in June 1930 is that every year the Department of Agriculture should maintain a total seed multiplication area of about 16,000

acres of *Jayawant* cotton and the seed obtained from this area should be purchased and distributed by the Hubli Co operative Cotton Sale Society for about 200 000 acres. The Committee has in its turn agreed to meet the cost of rogueing the crop of the seed multiplication area and to pay the Society a subsidy not exceeding Rs 5 000 per year to cover its loss if any on its seed transactions and interest at 5 per cent on the capital invested for the purchase of seed. The Department of Agriculture has till now fully discharged its obligations by maintaining the seed multiplication area as stipulated in the scheme. The area covered by the Society however fell short of expectation

Society
acres

75 *The Gadag Seed Extension Scheme* is very similar to the above scheme except that the seed multiplication area required to be maintained in this scheme is 24 400 acres of *Gadag 1* cotton as against 16 000 acres of *Jayawant* in the Hubli Scheme and it commenced in June 1930. The area covered by the Gadag Society did not exceed 100 000 acres in any one year except in 1931-32 when it

10 acres while the
area for seed

multiplication
review enough seed for 90 250 acres

76 *Surat Seed Extension Scheme* — This scheme was first sanctioned in 1929 for two years and was extended in 1931 for another two years pending the final decision of the Committee with regard to its policy in Surat area. The Committee in January 1934 after full consideration of the merits of the two rival cottons *1A* and *1027 A L F* finally decided to confine its attention to the latter and extended the scheme for a further period of five years. The Department of Agriculture arranged during the year a seed multiplication area of 14 347 acres and distributed 1 506 225 lb of *1027 A L F* seed in Surat Broach tract besides supplying another 377 829 lb to the adjoining States of Cbhotia Udepur and Baroda. In addition the Hansot Co operative Cotton Sale Society distributed in the area served by it another 428 734 lb obtained from its members. It is gratifying that many Cotton Sale Societies which had been till recently opposed to the distribution of *1027 A L F* seed have now accepted the Committee's policy and purchased large quantities of this seed.

77 *The Khandesh Seed Extension Scheme* was started in May 1931 with the object of extending *Banilla* cotton a cross between *Ban* and *Comilla* cottons in the Khandesh area. This cotton is susceptible to wilt and has also suffered its defects however,

It became therefore
spread rapidly on its

own merits and the Committee thought it desirable to sanction the scheme with a view to make this seed easily available in adequate quantities till a better strain is obtained from the Jalgaon Cotton Breeding Scheme. The

CHAPTER V.

SEED DISTRIBUTION SCHEMES.

71. THE Indian Central Cotton Committee felt convinced in 1929 that botanical and other research on cotton was of little consequence unless the results were made easily available to the cultivator and adopted accordingly the policy of helping the Departments of Agriculture and Co-operative Sale Societies in wider distribution of pure seed of the improved varieties of cotton. Sixteen seed schemes have since been sanctioned. Thirteen of them including the United Provinces C. 402 Scheme, which was started only in May 1935, are now under operation and one scheme for the sale of all farm crop produce in the Punjab was withdrawn during the year. The remaining two schemes, viz., Bilhongal and Haveri, have not yet been commenced for one reason or other though they were sanctioned as far back as in November 1929.

MADRAS PRESIDENCY.

72. *Tiruppur Co 2 (Cambodia) Seed Extension Scheme*.—The Committee sanctioned in 1929 a small scheme, the Madras (Tiruppur) Seed Extension Scheme, providing the pay of an officer to act as an advisor to a group of Co-operative Societies in Coimbatore District which had been interested in the distribution of Co. 2 seed, and the scheme started in May 1931. It was amalgamated in 1933 with a new seed scheme, Tiruppur Co. 2 (Cambodia) Seed Extension Scheme, sanctioned in August 1932 for the distribution of Co. 2 seed in Salem and Coimbatore districts through the agencies of the Agricultural Department and the Tiruppur Co-operative Trading Society.

obtained from the above area and distribute the seed to cultivators for about 100,000 acres. The Society in return has been guaranteed its actual loss on seed transactions upto a maximum of 10 per cent of the capital invested for the purchase of seed and interest thereon at 5 per cent. The Department of farm area of 4,122 acres which of this quantity had to be the rest was distributed for an

73. *The H1 (G. herbaceum) Seed Extension Scheme* has been suspended due to the difficulty of securing local co-operation in the supply of improved seed in the Bellary district. The question of a revised scheme is under consideration.

BOMBAY PRESIDENCY.

74. *Hubli Seed Extension Scheme*.—The main object of this scheme which came into operation in June 1930 is that every year the Department of Agriculture should maintain a total seed multiplication area of about 16,000

acres of *Jayawant* cotton and the seed obtained from this area should be purchased and distributed by the Hubli Co-operative Cotton Sale Society for about 200 000 acres. The Committee has in its turn agreed to meet the cost of rogueing the crop of the seed multiplication area and to pay the Society a subsidy not exceeding Rs 5 000 per year to cover its loss if any on its seed transactions and interest at 5 per cent on the capital invested for the purchase of seed. The Department of Agriculture has till now fully discharged its obligations by maintaining the seed multiplication area as stipulated in the scheme. The area covered by the Society however fell short of expectation every year for one reason or other. During the year under report the Society was able to distribute 1 462 861 lb of *Jayawant* seed enough for 146 286 acres the largest area covered by it since the beginning of the scheme.

76 Surat Seed Extension Scheme — This scheme was first sanctioned in 1929 for two years and was extended in 1931 for another two years pending the final decision of the Committee with regard to its policy in Surat area. The Committee in January 1934 after full consideration of the merits of the two rival cottons *1A* and *1027 A LF* finally decided to confine its attention to the latter and extended the scheme for a further period of five years. The Department of Agriculture arranged during the year a seed multiplication area of 14 347 acres and distributed 1 506 225 lb of *1027 A LF* seed in Surat Broach tract besides supplying another 377 829 lb to the adjoining States of Chhota Udepur and Baroda. In addition the Hansot Co operative Cotton Sale Society distributed in the area served by it another 428 734 lb obtained from its members. It is gratifying that many Cotton Sale Societies which had been till recently opposed to the distribution of *1027 A LF* seed have now accepted the Committee's policy and purchased large quantities of this seed.

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its defects however, It became therefore spread rapidly on its own merits and the Committee thought it desirable to sanction the scheme with a view to make this seed easily available in adequate quantities till a better strain is obtained from the Jalgaon Cotton Breeding Scheme. The

a seed multiplication
seed enough to cover
'a fetched a premium

78 *Athani Seed Extension Scheme*—The object of this scheme which
is to extend the area under cotton cultivation in the Athani
district by 10,000 acres. The scheme, which was first
proposed in 1932, was approved by the Government in
July 1934. The scheme will be implemented by the
Athani Cotton Extension Committee, which will be
responsible for the distribution of pure Banilla
seed and for the supervision of its sowing.

Department and partly by the Hubli Cotton Sale Society. The total seed multiplication area expected to be maintained during the year according to the original programme was 11,100 acres, but due to the loss of cotton crop by floods last year and consequent dearth of pure seed, it had to be reduced to

27,650 acres

79 *The Deccan Canals (Banilla) Seed Extension Scheme* is practically self supporting unlike other seed schemes, its recoveries being expected to cover its entire cost. Under irrigation in the Deccan Canal area *Banilla* gives as high yield as local *N R* and brings a premium of about Rs 15 per 500 lb of seed cotton over the latter. The total area expected to be covered by this cotton is, however, only 30,000 acres. The Committee in 1934 considered the advantages of replacing *N R* with *Banilla* in this tract and sanctioned the scheme with a view to provide the cultivator with pure *Banilla* seed in

sowing on the farm next year

80 *Sind Cotton Extension Scheme*—This scheme was started in April 1931 with a view to introduce cotton cultivation in areas where this crop was not grown before and to extend improved varieties in localities where cotton had already been established. The work continued more or less on the same lines as in previous years on both the left bank and the right bank of the Indus. On the left bank the main items of work consisted of (i) comparative tests of improved cottons, (ii) trials of high quality cottons such as *Sea Island*, *Ashmouni*, etc., and (iii) multiplication and distribution of improved seed. In comparative trials the same four varieties that were tested in previous years, viz., 27 W N. or desi (36 ginning percentage, 1 to 4/8 staple length

highest average yield in Southern Jamrao and Eastern Nara tracts of Thar

Parkar district and in the northern part of Hyderabad district, while 27 W N , closely followed by 289F-1, took the highest place in northern Jamrao tract, southern part of Hyderabad district and in Naushahro and Nawabsbah Divisions of Nawabshah district. High quality cottons, Ashmouni 37, Boss III-16 and Sea Island 2-4 were tried in nine centres in Southern and Northern Jamrao tracts and the results surpassed even the highest expectations. The Department of Agriculture organised a seed multiplication area of 2 710 acres and distributed 785,335 lb of pure seed in addition to 411,430 lb distributed by the Sind Provincial Co-operative Bank. A very important feature of the left bank, during the year was the keen demand for 289F-1 seed not only in Thar Parkar district where this cotton is extensively grown, hut also in Nawabshah and Hyderabad districts where only *desi* types were hitherto under cultivation.

On the right bank cotton cultivation was unknown till 1931-32 when on starting the scheme a small area of 25 acres was for the first time brought under this crop. With this small beginning the area under cotton increased to 4,000 acres during the year and there is every prospect of this crop extending over a very large area. The results of the past four years indicate that 4F is better suited for the right bank than *desi* or any other cotton so far tested and that the soils of Dadu district are better fitted for cotton cultivation than those of Larkhana district which have been for a long time under rice cultivation.

CENTRAL PROVINCES AND BERAR.

81 *The Verum Seed Distribution and Marketing Scheme*—The main object of this scheme when it was started in September 1930 was to extend *Verum* 202, but on the expiry of the scheme in July 1934 the Committee in pursuance of its new policy to encourage wherever possible medium and long

5,277 *khandies* (4,137,168 lb) of pure seed were purchased and stocked for distribution in 1935-36 season. The Department of Agriculture were also able to arrange the sale of 5,750 bales of pure cotton at a premium ranging from about Rs 13 5 to Rs 90 per *khandy* of 784 lb over Broach, the average premium for the whole lot works out at Rs 62 3 over Broach and Rs 82 over Oomras on the basis of G O R Bombay

which came into operation in

the year amounted to 4

sowing only a small portion of this seed was sown on an area of 6 370 acres against 24 000 acres of the previous year. The Department of Agriculture made a serious effort to organise a large seed multiplication area but it ended

in disappointment for want of rains. They had therefore to depend once again on Hubli Gadag and Kophal Cotton Sale Societies for their seed supply in 1935 36 season

BARODA STATE

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ed enough for sowing on 20 230 acres including f 5 382 acres In Baroda as in other parts of from frost and the Department of Agriculture have made necessary arrangements to meet the demand for pure seed during the next season

RESEARCH STUDENTS

84 Ever since its establishment the training of research worker in the various branches of science pertaining to cotton has been one of the Committee's principal concerns. Distinguished graduates are selected and placed for training under experienced research workers either on the Committee's schemes at the Institute of Plant Industry Indore at the Committee's Technological Laboratory or under Professors in Indian Universities. Sometimes scholarships are awarded to students for training abroad at recognised institutions. The term of scholarships is usually two years but extensions are sometimes sanctioned if found necessary.

Scholarships are awarded under two categories viz Training Grants and General Scholarships. The former are intended for Government servants who are recommended by provincial governments and for employees of the Committee who are considered suitable. General Scholarships are awarded to University Sub-Committee Research Students Selection scholars are invited by advertisement

Fifty two research scholarships and six training grants have so far been awarded by the Committee out of these one scholarship and four training grants were for foreign study. During the year under report eight research students were under training—three in India and five abroad. Only one scholarship was awarded during the year.

Expenditure on Research Studentships up to the 31st August 1935 amounted to Rs 243 145-2-4

P H RAMA REDDI
Secretary

CHAPTER VI.

ANNUAL REPORT OF THE DIRECTOR, TECHNOLOGICAL LABORATORY, FOR THE YEAR ENDING 31st AUGUST 1935.

THE present report contains an account of the work done at the Technological Laboratory from 1st September 1934 to 31st August 1935. A notable event in the life of the Laboratory which took place during this period was the extension of several of its sections. The work of the Laboratory had grown steadily from year to year, during the past few years especially it had increased at a high rate. In order to cope with this increase in the work, it had become necessary to employ more staff and to install more machines and testing apparatus from time to time. As a result the Spinning Room, the Yarn Testing section and the Fibre Testing section had become overcrowded to an extent which threatened to lower the efficiency of the work. Moreover, the blow room plant of the Spinning Laboratory was installed more than 10 years ago. With the recent improvements in the design and construction of the blow-room machinery some of our machines had become obsolete. In view of the fact that the Indian Central Cotton Committee aims, on the one hand, at maintaining a high standard of efficiency in the work of the Laboratory and,

the blow-room machinery full details of the extensions carried out with these two objects will be found on page 66. The work done at the Laboratory will now, as usual, be described under the following five heads —

- I Spinning Laboratory.
- II Research Laboratory
- III Moisture Testing Section
- IV. Publications.
- V General

I SPINNING LABORATORY

The following statement gives a summary of the samples of different cottons tested at the Laboratory during the period under review together with the names of the suppliers of the samples :

BOMBAY.

- (1) *The Cotton Breeder, S M C, Dharwar* — 9 samples of Jayawant and other cross strains

- (2) *The Cotton Breeder, Jalgaon*—18 samples of Banilla, N R and local cottons.
- (3) *The District Cotton Overseer, Hubli*—One sample of Jayawant cotton
- (4) *The Principal Agricultural Officer, Padegaon*—9 samples from irrigation and soil experiments
- (5) *The Cotton Breeder, Surat*—4 samples of different strains and 4 samples of 1027 A L F and B D 8 mixings
- (6) *The Superintendent, Agricultural Station, Broach*—One sample of B D 8
- (7) *The Cotton Breeder, Broach*—Two samples of selections, one of Broach Local, and 3 samples of B D 8 and other strains
- (8) *The Cotton Breeder, Viramgam*—One sample of Wagad Local Wagad 8 and 3 selections and 4 samples of B D 8 and other selections
- (9) *The Officer in charge Government Seed Farm Mirpurkhas*—10 samples from irrigation and manurial experiments
- (10) *The Botanist in Sind, Sakrand*—One sample of 4F cross strain, 7 samples of Boss III, Sea Island and other strains
- (11) *Cotton Supervisor, Indus Right Bank, Dadu*—3 samples of 289F-1 and other strains
- (12) *Cotton Physiologist, Agricultural Research Station, Sakrand*—10 samples from irrigation and manurial experiments
- (13) *The Agricultural Chemist and Soil Physicist, Sakrand*—5 samples of 289F from irrigation experiments

PUNJAB

- (1) *The Cotton Research Botanist Lyallpur*—19 samples of different strains, 3 samples of 43F, Mollisoni and 289F
- (2) *The B C G A , Jhudo*—One sample of Sind L S S

UNITED PROVINCES

The Economic Botanist to Government, U P, Cawnpore—7 samples of C 402 and 520 selections

CENTRAL PROVINCES

- (1) *The Economic Botanist for Cotton, C P , Nagpur*—3 samples of Bansi and other selections and 5 samples of strains
- (2) *Superintendent, Government Farm, Akola*—One sample of Late Verum

MADRAS.

- (1) *The Cotton Specialist, Coimbatore*—Six samples from rotation experiments one of Co 2 and 3 strains, one sample of Khlay cotton
- (2) *The Superintendent, Agricultural Research Station, Koilpatti*—9 samples of different strains and one sample of Uppam cotton
- (3) *The Farm Manager, Agricultural Research Station, Guntur*—7 samples of different strains
- (4) *The Assistant Director of Agriculture, Salem*—2 samples of Co 2

MISCELLANEOUS

- (1) *The Director, Institute of Plant Industry, Indore*—26 samples from multiplication sowing, manurial irrigation and other experiments, 5 samples of Malvi and other strains
- (2) *The Agricultural Inspector, Devangere*—One sample of Selection 69 and one of Local Sannahatti
- (3) *The Agricultural Inspector, Chitaldrug*—3 samples of Selection 69
- (4) *The Senior Assistant Botanist, Mysore State, Bangalore*—One sample of H 190, 3 samples of Selection 69 and 10 samples of different selections
- (5) *The Cotton Research Botanist Parbhani*—10 samples of Gaorani and other selections
- (6) *The Agricultural Officer, Bikaner State, Ganganagar*—Three samples of Mollisoni from irrigation experiments
- (7) *The Crop Botanist Malwa Division, Ujjain*—10 samples of different selections
- (8) *The Inspector, Cotton Seed Distribution, Kopbal*—One sample of Jayawant
- (9) *The Officer in charge, Cotton Research Station, Baroda*—One sample of Broach 9

- (10) *The Second Economic Botanist, Bengal, Dacca* —One sample of Co. (Bengal) cotton
- (11) *The Director of Agriculture, Peradeniya, Ceylon* —One sample of Cambodia cotton grown in Ceylon
- (12) *The Senior Botanist, Bukalasa Experimental Station, Bombo Uganda* —8 samples of Uganda cottons

It may be mentioned here that after a considerable lapse of time a sample of Cambodia cotton, of which seed had been obtained from the Madras Presidency, was received from the Director of Agriculture, Ceylon, where it had been grown. Also, another sample of the same cotton was received for the first time from the Second Economic Botanist, Bengal, Dacca. The receipt of these two samples at the Laboratory indicates the efforts that are being made in India and in adjacent countries to extend the cultivation of medium staple cotton.

The following tables give the distribution of samples, lots and counts spun and tested at the Laboratory in each season since 1924 —

TABLE I—*Distribution of Samples Spun, 1924-35*

Province	1924 23	1925 26	1926 27	1927 28	1928 29	1929 30	1930 31	1931 32	1932 33	1933 34	1934 35	Total 1924-35
Bombay	18	26	22	22	28	65	89	60	143	111	67	60
Punjab	14	1			42	30	10	45	65	42	25	22
United Provinces	7		6	11	9	7	16	7	12	6	7	8
Madras	22	19	60	23	30	81	66	15	28	101	80	41
Central Provinces	22		3	2	2	5	3	3	3	9	9	4
Miscellaneous	3	11		6	27	28	33	75	97	85	37	37
Total	46	57	81	64	117	186	212	171	318	306	251	186
Standard Cotton Tests												
Trade Tests and Special Tests	8	54	40	61	23	33	27	18	18	18	18	82
Total Tests	54	111	130	128	150	257	323	323	461	648	400	285

TABLE II—*Distribution of Lots Spun, 1924-35*

Province	1924 23	1925 26	1926 27	1927 28	1928 29	1929 30	1930 31	1931 32	1932 33	1933 34	1934 35	Total 1924-35
Bombay	30	57	44	44	53	107	90	69	143	111	97	84
Punjab	26	4			83	41	10	44	65	42	23	32
United Provinces	14		12	22	18	14	16	7	12	6	7	12
Madras	4	33	100	46	60	85	66	16	28	101	80	5*
Central Provinces	2	8	4	4	10	4	4	3	5	9	9	6
Miscellaneous	3	22		12	9	33	29	33	75	97	85	39
Total	86	116	162	123	227	220	215	172	318	306	251	233
Standard Cotton Tests												
Trade and Special Tests	31	176	147	178	68	61	54	36	36	32	36	82
Total Tests	117	292	304	305	295	321	358	324	433	573	482	400

TABLE III.—*Distribution of Yarns Spun, 1924-35*

Province	1924 25	1925 26	1926 27	1927 28	1928- 29	1929 30	1930 31	1931 32	1932 33	1933 34	1934 35	Totals 1924-35
Bombay	103	152	132	132	159	322	233	203	430	332	293	2,510
Punjab	106	14			254	113	31	136	165	127	72	1,018
United Provinces	27		38	66	54	42	40	22	32	18	21	358
Madras	12	108	278	138	180	253	109	53	85	303	90	1,701
Central Provinces	8		18	12	12	30	12	9	15	27	29	17
Miscellaneous	3	58		36	27	99	100	63	227	293	250	1,186
Total	259	332	461	384	696	861	635	516	944	1,100	754	8,945
Standard Cotton Tests	93	514	423	417	290	213	309	136	200	180	204	3,021
Trade and Special Tests						80	343	502	256	409	810	2,490
Total Tests	341	846	887	831	96	1,161	1,287	1,154	1,310	1,779	1,768	12,456

It will be seen that as compared with the last year the total number of samples and lots spun in the Laboratory shows a decline, though the number of counts spun during the period under review is practically the same. The decrease in the number of samples and lots is due to the fact that for more than

be retarded in order to make provision for the equipment in the enlarged room.

was a small decrease in the number

be seen from Table I even this reduced number is in excess of those for all the previous years excepting the last two years

include those small size samples
ts nor the samples of yarn on

The former relate to strains which are as yet in the early stages of experimentation and on which a fibre test is required by the cotton breeder in order to narrow down his field of selection so that he may grow in the subsequent seasons the most promising strains in quantities sufficiently large for a spinning test. A statement, giving a description of these samples, together with the names of the suppliers is given on page 56. The yarn samples are mostly received from mills or firms in their private capacity and are tested at the Laboratory on payment of certain fees laid down by the Indian Central Cotton Committee. A full schedule of the fees for the various tests which are performed for the benefit of mills and firms will be found on page 52.

The results of the tests carried out at the Laboratory are embodied in spinning test, fibre test and yarn test reports. These reports are sent to the suppliers of the samples, and in the case of agricultural samples submitted by the cotton breeders copies of them are sent to the officers of the East India Cotton Association.

which are
try. The
under each
with the
corresponding numbers for last year —

TABLE IV.—*Test Reports issued, 1924-35*

—	1924- 25	1925- 26	1926- 27	1927- 28	1928- 29	1929- 30	1930- 31	1931- 32	1932- 33	1933- 34	1934- 35
Spinning Test Reports	7	18	19	22	21	63	92	60	87	121	112
Fibre Test Reports	1	1	5	1	7	4	7	19	30	18	19
Yarn Test Reports				1	4	4	2	3	5	3	7
Total Reports	8	20	24	24	32	71	101	82	122	142	138

It will be seen that no commercial test reports were issued in 1924-25.

slightly less than that of last year as fewer samples could be spun owing to the work involved in the extension of the Laboratory

The strength of the permanent staff employed at the Laboratory from year to year since 1924 is given in the following table —

As at August 31st in	1924	1925	1926	1927	1928	1929	1930	1931	1932	1933	1934	1935
Technical Staff	8	11	20	21	27	27	33	32	32	33	31	31
Research Students	1	3	6	4	3	2	1	1				
Fumigation Chemists			2	4	2	2	2	2	2	2	2	2
Total	9	14	28	30	32	31	35	35	34	35	36	35

It may be mentioned here that in view of the large number of samples received for tests it was found necessary to employ two temporary Junior Testers for a period of four months each

CLASSIFICATION OF SAMPLES

The samples received for tests at the Technological Laboratory fall into the following four classes :—

- (a) Agricultural samples
- (b) Standard Indian cottons
- (c) Trade samples
- (d) Technological samples

We shall now describe briefly the work done under these four heads

* * * * *

samples are received from the cotton
are engaged in the work of improving
They mostly represent strains which

of special mention

report was very carefully considered by the Technological Research Sub Committee and it was decided that as this investigation had yielded interesting results it should be continued and that the results so far available should be published. In the current year samples for this purpose have been received from Lyallpur Coimbatore Sakrand Ganganagar and Padegaon

(2) *Uganda cottons* —It will be remembered that for the last three years the Technological Laboratory has made tests on samples of improved variety of Uganda cottons submitted by the Department of Agriculture Uganda

E provided for testing 16 instead of 8 samples. This request was considered by the Technological Research Sub Committee at its meeting held in August 1935 and it was decided that as in the past 8 samples may be tested free of charge but that for any additional samples the usual fees should be charged

(3) *Tests on 38F and 43F* —These two strains are further selections from Punjab American cotton and have been under trial at Lyallpur for some years past. Having given very satisfactory results on the farm it was decided to try them out in the cultivators fields in order to see which of these two strains would be more suitable for general cultivation. Accordingly, about 20 samples of these two strains were received and tested at the Laboratory and reports embodying the results of fibre tests and spinning performance were sent to the Department of Agriculture Punjab

(4) *Tests on Boss III and Sea Island* —These are two long staple cottons which are under trial in the new Barrage area in Sind. During the past six years that they have been tested at this Laboratory they have given very satisfactory results and yarns ranging from 60 s to 80 s of satisfactory evenness have been spun from them. As it is possible that the cultivation of these cottons may be extended in the near future rather more detailed tests which

included the spinning of carded and combed yarns were made on them in the current year. For purposes of comparison a sample of Egyptian Giza 7 was obtained and treated in the same manner and the results for the Sind cottons were compared with those obtained for Giza 7. A report containing the results of these experiments was sent to the Agricultural Department, Sind.

(b) *Standard cottons*—As in the past detailed spinning and fibre tests were made on the standard Indian cottons of the last season. These cottons represent certain improved varieties, which are now being grown to the extent of 15 per cent of the total area under cotton cultivation in India. This year four new varieties were included among the standard Indian cottons. Two of these came from Sind, where as a result of the development of the Sukkur Barrage, the area under cotton cultivation is increasing at a considerable rate. These two cottons have been named "Sind Sudhar" and "Sind N R". The former is an improved type of Sind American and represents the long staple cotton which will be extended in Sind in the future. The latter is a selection from the Sind-Desi type, which has been selected for general cultivation in Sind on the basis of its stand in the field, yield, ginning percentage and colour. The other two new standard cottons are further selections of C. P. Verum 262 and are named "V 434" and "Late Verum". The former is specially suited to areas where the rainfall is irregular, while the latter is specially suited to areas in which the monsoon is likely to continue late in the season. These cottons have been tested in the past at the Technological Laboratory and besides possessing the above mentioned advantages have given, on the whole, even better results than Verum 262.

As most of the standard cottons are a public

tory During the year under review 4-page circulars were published on the following nine cottons —

- 1 Umri Bani
- 2 Verum 262 (Nagpur)
- 3 Verum 262 (Akola)
- 4 Punjab-American 289F
- 5 Punjab-American 4 F
- 6 Jayawant (Kumpta)
- 7 Surat 1027 A L F
- 8 Gadag 1 (Dharwar-American)
- 9 Cambodia Co 2

(c) *Trade samples*—(1) As in the past spinning tests were made on samples of trade varieties which form the bulk of the Indian cotton crop. These samples are tested in accordance with the arrangements between the

Indian Central Cotton Committee on the one hand and the East India Cotton Association Bombay and the Millowners Associations of Bombay and Ahmedabad on the other. The cotton samples supplied by the East India Cotton Association under season while those supplied are of the early arrivals can

first hand information to the trade and the industry regarding the waste of these tests are not only the results of the same variety

in the previous seasons. Thus these circulars not only furnish information regarding the performance of these cottons in the current season but they also enable one to find out whether a given variety is maintaining its quality or is showing signs of deterioration. In view of the practical value of these tests it has been decided to publish these circulars collectively in the form of a bulletin. The following statement gives the description of trade samples tested during the period under review.

Cottons supplied by the East India Cotton Association —

1	C P No 1	14	Westerns (Jhaveria)
2	Berar	15	Farm Westerns
3	Khandesh	16	Coompta
4	Nanded	17	Upland (Gadag)
5	Lattur	18	Bijapur
6	Muttia	19	Bagalkote
7	Punjab American	20	Cambodias
8	Broach	21	Tinnevelly
9	Jagadia Farm	22	Karungannis
10	Surat	23	A R Kampala
11	Navsari	24	A R Busoga
12	Dholleras (Wagadia)	25	A R Jinja
13	Kalagin		

Cottons received in accordance with the arrangement made with the Millowners Associations of Bombay and Ahmedabad

BOMBAY

1	Hansi (Bengal)	11	Shedbal (Miraj)
2	Saudha (Khandesh)	12	Farm Westerns
3	Ujjain (Central India)	13	Broach
4	Padtur (Moglai)	14	Bailhongal
5	Mandsaur (Ujjain)	15	Tiruppur Cambodia
6	Hubli Compta	16	Karunganni
7	Hubli Upland	17	Nandyal
8	Surat	18	Northern Cambodia
9	Cambodia	19	A R Kampala
10	Guntakal (Westerns)	20	A R Busoga

AHMEDABAD

N1

A list of the Technological Circulars issued on these samples will be found under Publications

In addition to these tests of which the results are published for general information and firms in samples were for spinning

for spinning of wax content, one for fibre maturity and two for determination of blow room loss. These tests are undertaken on payment of certain fees laid down by the Indian Central Cotton Committee which are reproduced below.

SCALE OF FEES

Rs. a. p.

(11) Percentage of immature fibres—						
(a) In lint or kapas	10	0	0			
(b) In yarn or cloth	15	0	0			
(12) Wax content—						
(a) 1 Sample	12	8	0			
(b) 2 Samples	22	8	0			
(c) 3 Samples	30	0	0			
(d) Each additional sample	7	8	0			
(13) Determination of mechanical injury to fibre.	10	0	0			
(14) Tests in addition to the ordinary roller system	10	0	0	per system.		
(15) Cloth Samples—						
(a) Actual counts	15	0	0			
(b) Actual twist	20	0	0			
(c) Single thread strength	20	0	0			
(16) Moisture Tests—						
(a) 1 Sample	5	0	0			
(b) 2 Samples	7	8	0			
(c) 3 Samples	10	0	0			
(d) 4 Samples	12	8	0			

(2) *African cottons*—It will be recalled that during the last three years

was considered in June last by their Special Appeal Committee on African cottons, who made their recommendation regarding the standards of length for these cottons to the Board of the Association on the basis of this report

(3) *Effect of artificial watering on the spinning quality of cotton*—These tests have been in progress for some time with the object of finding out the effect on spinning quality of the addition of a known quantity of water to cotton before it is pressed into a bale. For this purpose, the two cottons selected were Amraoti and Broach (Palej) and for each cotton a number of bales containing different quantities of water added to them before pressing were prepared, samples were drawn from these bales from time to time and subjected to fibre and spinning tests. During the period under review the results for the

(4) *The effect of different degrees of compression on the spinning quality of cotton* — It was originally the intention to make tests on two cottons namely Superfine Oomra and Punjab American 289F with a view to finding out whether and to what extent the spinning quality of cotton is affected by the degree of compression in a bale. The tests however could only be made on Superfine Oomra and the results of these tests were considered by the Technological Research Sub Committee in February last. It was felt that the effect of compression if any would be more pronounced in the case of the comparatively long staple cottons. It was accordingly decided that these tests should be performed on Punjab American 289F Surat 1027 A L F Jayawant and Cambodia. Bales pressed to the same size but weighing nearly 400, 300 and 200 lb of the four above mentioned cottons have been purchased and the necessary tests will be made in due course.

(5) *Deterioration of cotton stored in the open and in shed at Karachi* — During the period under review this investigation was also completed and a report containing the results and the main conclusions was placed before the Technological Research Sub-Committee at its meeting held in August last. The Committee decided that the results were highly interesting and that as they showed that cotton stacked in the thole yard definitely suffered both in grade and spinning performance a copy of the report should be sent to the Karachi Cotton Association with the recommendation that they should request the Karachi Port Trust to provide more godown facilities at Karachi.

(d) *Technological Samples* —

(1) *Limit spinning tests* — In order to study the effect of insertion of twist on the strength been undertaken with American 4F which pliers ranging from 3½ to 5½. This investigation is in progress.

(2) *High Draft tests* — The Laboratory has already issued two Bulletins on the results of application of high draft spinning to Indian cottons. Since the publication of the last Bulletin some more systems of high draft spinning have been acquired by the Laboratory and accordingly another investigation has been undertaken in order to extend the scope of the former work. For this purpose mixings of two Indian cottons have been spun on five systems of high draft spinning in addition to the ordinary system. This investigation is in progress.

(3) *Effect of balanced and unbalanced drafts on mixings* — For the purpose of this investigation mixings were made in different proportions from P.A 289F with P.A 4F Mollisoni with P.A 4F and Kampala with P.A 4F. Suitable

hank rovings prepared from these mixings were spun with balanced and unbalanced drafts into identical counts and the yarns were examined for strength evenness elasticity etc This investigation was completed during the period under review and an account of it will be published in the form of a Technological Bulletin

(4) *Effect of storage of seed-cotton prior to ginning*—During the period under review this investigation was completed and the results were published in a Technological Bulletin a summary of which will be found on page 64 The Technological Research Sub Committee while considering the report of the work on this subject decided that these tests may also be performed on Wagad 8 and Punjab American cottons with the storage period increased to about 4 months

(5) *Combing of good-quality Indian cottons*—It was stated in one of my previous Annual Reports that an investigation was undertaken at the Technological Laboratory to find out the limit spinning performance of four good quality Indian cottons when these had been combed to the extent of 20 per cent and 30 per cent Alongside of the spinning of fine counts from the combed cottons both on the ordinary system and a high draft system the comber wastes obtained from these cottons were mixed with low quality cottons and were spun into relatively coarse counts During the period under review an account of this investigation was written up and published in the form of a Technological Bulletin a summary of which will be found under Publications

(6) *Comparative tests on the effect of change in the blow room machinery*—It has been mentioned above that during the period under review the blow room plant of the Laboratory was overhauled some old machines were discarded and new machines were installed As one of the primary functions of

results of yarn tests on these samples when available will yield the necessary correction factor if any which should be applied as a result of the alteration in the blow room plant

II RESEARCH LABORATORY

Fibre Testing Section—It is customary at the Laboratory to determine the principal fibre properties of all the agricultural samples on which spinning tests are carried out Besides this fibre tests are also made on the standard Indian cottons as well as on the samples which are tested at the Laboratory

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Microscopy Section—Mr A N Gulati—It was stated in one of the previous Annual Reports that an investigation was undertaken at this Laboratory in order to study the relationship between the fibre maturity and the degree of yarn neppiness of a cotton. For this purpose a large number of cottons were selected and were examined for the percentage of mature, half mature and immature hairs. During the period under review an account of this investigation was published in a Technological Bulletin, a summary of which will be found under 'Publications'. Mr Gulati also continued his investigation on the bacterial and fungoid growth in connection with the deterioration of Broach cotton. For this purpose, he prepared cultures in special media of the various micro organisms which were found associated with this cotton and was successful in isolating and identifying most of them. Arising from the examination of the Broach cotton stored for nearly a year, he observed a new type of bacterial infection of which no mention appears to have been made by any of the earlier workers on this subject. In this type of infection the bacteria, instead of merely puncturing the walls of the fibre, were found to feed upon the secondary cellulose, working their way gradually along the length of the fibre. Mr Gulati took several photographs showing this type of bacterial infection and an account of these observations has been sent for publication in the Indian Journal of Agricultural Science. It should also be stated that, in addition to the above work, Mr Gulati examined numerous samples for fibre maturity in connection with the routine work of the Laboratory. It is now proposed to hand over the fibre maturity work to the Fibre Testing Section as a part of their normal activity.

Dr L Thoria joined the staff of the Laboratory on 1st May 1935. He began work on the possibility of the utilisation of the short staple cottons for the manufacture of artificial silk and staple fibre. For this purpose, Dr Thoria prepared ~~samples~~

III MOISTURE TESTING SECTION

In view of the fact that in the last three years sufficient data has been collected with regard to the average moisture content of Indian cottons received in Bombay at different times of the year and its variation in the dry and the wet season, only 26 samples were subjected for moisture tests during the period under review. These samples included 7 from the Appeal Committee of the East India Cotton Association, 4 from trade bales and 15 in connection with the Laboratory investigations. The total number of samples so far tested

Appeal Committee of the East India Cotton Association, was written up during the period under review. This report was considered by the Moisture Tests Sub Committee of the Association who made their recommendations for standards of moisture to the Board of the Association.

IV PUBLICATIONS

The following is a list of Technological Bulletins and Circulars issued during the period under review —

I Technological Bulletins, Series A, Nos 26 and 27

- (1) Technological Bulletin, Series A, No 26 "Technological Reports on Standard Indian Cottons, 1934" by Nazir Ahmad, M Sc, Ph D, F Inst P
- (2) Technological Bulletin, Series A, No 27 "Combing of Good Quality Indian Cottons" by R P Richardson, F T I, and Nazir Ahmad M Sc, Ph D, F Inst P

II. Technological Bulletins, Series B Nos 19 and 20

- (1) Technological Bulletin, Series B, No 19 "Effect of Storage Prior to Ginning on the Spinning Quality of Cotton" by Nazir Ahmad, M Sc, Ph D, F Inst P
- (2) Technological Bulletin, Series B, No 20 "Fibre-Maturity in Relation to Fibre and Yarn Characteristics of Indian Cottons" by Amar Nath Gulati, M Sc, and Nazir Ahmad, M Sc, Ph D, F Inst P

III Technological Circulars Nos 150 to 195, as under —

Circular No	Title	Date of publication
150	Spinning Test Report (No 514) on samples of A R Kampala A R Busoga and A R Jinja cottons 1933 34	September 1934
151	Spinning Test Report (No 515) on samples of Bijapur cotton 1933 34	September 1934
152	Spinning Test Report (No 516) on samples of Upland cotton 1933 34	September 1934
153	Spinning Test Report (No 517) on samples of Karun	September 1934
154		October 1934
155		November 1934
156		December 1934
157		January 1935
158		February 1935
		March 1935

Circular No	Title	Date of publication
159	Spinning Test Report (No 560) on samples of Berar <small>cotton 1934-35</small>	February 1935
160	samples of Khandesh	February 1935
161	samples of Khandesh	February 1935
162	on samples of Mogla	February 1935
163	Spinning Test Report (No 568) on samples of Bengal's cotton 1934-35	February 1935
164	Spinning Test Report (No 570) on samples of Ujjain (Ujjain) cotton 1934-35	February 1935
165	Spinning Test Report (No 571) on samples of Ujjain (Mandsaur) cotton 1934-35	February 1935
166	Spinning Test Report (No 577) on samples of Hubli Kumpta cotton 1934-35	February 1935
167	Technological Report on Gadag 1 (Dharwar American) 1934-35	March 1935
168	Spinning Test Report (No 582) on samples of Latur cotton 1934-35	April 1935
169	Spinning Test Report (No 583) on samples of Nanded cotton 1934-35	April 1935
170	Spinning Test Report (No 584) on samples of Mutha <small>cotton 1934-35</small>	April 1935
171	-	April 1935
172	-	June 1935
173	-	June 1935
174	-	June 1935
175	Spinning Test Report (No 596) on samples of Broach cotton 1934-35	June 1935
176	Spinning Test Report (No 597) on samples of Karun ganni cotton 1934-35	June 1935
177	Spinning Test Report (No 598) on samples of Tiruppur Cambodia cotton 1934-35	June 1935
178	Spinning Test Report (No 599) on samples of Northern Cambodia cotton 1934-35	June 1935
179	Spinning Test Report (No 600) on samples of Farm Westerns cotton 1934-35	June 1935
180	Spinning Test Report (No 601) on samples of Westerns cotton 1934-35	June 1935
181	Spinning Test Report (No 602) on samples of Mira cotton 1934-35	June 1935
182	Spinning Test Report (No 603) on samples of Nandyal cotton 1934-35	June 1935
183	Spinning Test Report (No 604) on samples of Surat cotton 1934-35	June 1935
184	Spinning Test Report (No 606) on samples of Tiruppur Cambodia cotton 1934-35	July 1935
185	Spinning Test Report (No 607) on samples of African Busoga cotton 1934-35	July 1935

Circular No	Title	Date of publication
186	Spinning Test Report (No 608) on samples of Kampala cotton 1934 35	July 1935
187	Spinning Test Report (No 609) on samples of Hubli Upland cotton 1934 35	July 1935
188	" " "	July 1935
189	" " "	July 1935
190	" " "	July 1935
191	Spinning Test Report (No 613) on samples of Farm Westerns cotton 1934 35	July 1935
192	Technological Report on Jayawant (Kumpta) cotton 1934 35	August 1935
193	Technological Report on Cambodia Co 2 (Cambodia 440) 1934 35	August 1935
194	Spinning Test Report (No 620) on samples of Navsari cotton 1934 35	August 1935
195	Spinning Test Report (No 621) on samples of Upland cotton, 1934 35	August 1935

The following is a summary of Technological Bulletins, Series A, No 27 and Series B, Nos 19 and 20 —

(1) *Technological Bulletin, Series A, No 27 "Combing of good-quality Indian Cottons"*—The present bulletin describes the results of combing tests carried on four good quality Indian cottons, namely, P A 289F, Cambodia Co 1 Nandyal 14 and Surat 1027 A L F. These cottons were combed on a Nasmyth Comber to the extent of 20 per cent and 30 per cent (27 per cent in the case of 1027 A L F for the higher degree of combing). The resulting slivers were spun on the ordinary and a high draft system of spinning into counts much finer than those permissible for the carded material. The comber wastes in each case were mixed in the proportion of 1 : 3 with a low quality cotton grown in the same province and the good quality cottons and the mixtures thus obtained were spun into suitable counts on the ordinary system. The behaviour of each sample during spinning was noted and the yarns obtained were examined for evenness, neppiness and strength. In the course of this investigation 103 different spinnings were carried out giving rise to 1 004 bobbins for tests. The number of lea tests performed amounted to 4,957, that of ballistic tests 4,870 and that of single thread tests 10,040, making a grand total of 19,867 tests for yarn strength alone. Besides these the low quality cottons the comber wastes and the carded and the combed slivers of the good quality cottons were subjected to fibre tests for the determination of mean fibre-length, fibre-length irregularity and fibre weight per inch. From a consideration of the results of all these tests the following conclusions are arrived at —

1. The mean fibre length of the combed material for each of the four cottons, was either equal to or only slightly higher than that of the carded

material. The process of combing, therefore, even to the extent of 30 per cent did not bring about a large increase in the mean fibre-length of any of these cottons.

2 The process of combing on the other hand, was remarkably effective in reducing the fibre length irregularity of these cottons. The improvement in this direction was most pronounced in the case of the cotton (P.A. 289F) which had the highest value of fibre length irregularity. Thus, the combed cottons were only slightly longer but much more regular in length than the carded cottons.

3 The 20 per cent comber waste was found, in each case to be about 15 per cent shorter than the cotton from which it was extracted. Its fibre-length irregularity percentage was however, independent of the cotton being nearly 24 in each case. The 30 per cent comber wastes were on the whole somewhat longer and less irregular in length than the 20 per cent comber wastes but unlike the latter their mean fibre-length did not bear any straightforward relationship to that of the cotton nor their fibre-length irregularity was confined to a narrow range.

4 The hair weight per inch of the comber wastes was either very nearly equal to or a little higher than that of the carded material depending upon the botanical variety of the cotton.

5 Yarn breakages on the ring frame were on the whole less on the high draft than on the ordinary system thus making it possible to spin within the economic limit finer counts on the former system.

6 The process of combing considerably reduces though does not completely eliminate neppiness in cottons in general and is most effective in the case of such cottons as P.A. 289F which ordinarily give rise to neppy yarns.

7 When the low quality cottons were mixed with the comber wastes, the yarns obtained from the mixtures were in each case more neppy than those spun from pure cottons though in no case were they so neppy as to be unserviceable. Besides the neppiness content of a cotton and a comber waste other factors such as the capacity of the two to mix together operate in determining the neppiness of the yarns obtained from the mixture.

8 The system of spinning ordinary or high draft made no difference to the degree of neppiness of the yarns.

9 Though the yarns spun from the combed cottons were much finer than those obtained from the carded cottons they were, on the whole quite satisfactory from the point of evenness.

10 The high draft system gave more even yarns than the ordinary system the improvement in this respect being more marked in the carded than in the combed yarns.

11 The effect of a comber waste in determining the evenness class of yarns spun from its mixture with a pure cotton depends upon the spinning quality of the former as compared to that of the latter. Where the two are very nearly equal, the yarns spun from the mixture are just as even as, or only very slightly less even than, those obtained from the pure cotton. Where, on the other hand, the waste is of a definitely poorer quality than the pure cotton, the yarns obtained from the mixture are appreciably less even than those spun from the pure cotton.

12 Combing to the extent of 20 per cent made a very considerable

was found that for these four cottons at least the percentage improvement in spinning quality followed the order of the mean fibre length of the cottons

..... ided stronger yarns
ver, was more pro-
It was also more

marked in the finer than in the relatively coarser counts

14 In the case of three cottons the beneficial effects of (1) combing to the extent of 20 per cent and (2) spinning on the high draft system were found to be additive, while in the fourth case in which the effect of the 20 per cent combing alone was very large, it was not the case.

15 Whereas combing to the extent of 20 per cent raised the capacity of these cottons to spin into finer counts by a very considerable amount, combing to the extent of 30 per cent did not *in all cases* confer a benefit commensurate with the additional loss of 10 per cent fibres. The use of the higher degree of combing may not, therefore, prove an economic proposition in every case. As to when combing should be advantageously pushed up to 30 per cent and when it should be left at 20 per cent depends upon the system of spinning employed and the variety of cotton under test. In connection with the latter point, it was found that if 20 per cent combing produced very large improvement in the spinning quality of a cotton, combing to the extent of 30 per cent did not appreciably raise its spinning performance. If, on the other hand, the initial improvement resulting from 20 per cent combing is not so large, there is room for further improvement in spinning quality by extracting 30 per cent fibres.

16 20 per cent combed cottons spun on the high draft system gave very nearly the same results as those obtained for the 30 per cent combed cotton spun on the ordinary system. Thus, where the high draft system used in these tests is or can be made available, it would be more economical to comb the cotton only to the extent of 20 per cent and employ the high draft system in their spinning rather than push the combing to 30 per cent and use the ordinary system.

17 The main causes for the very considerable improvement in the spinning
other 1
a more
combed material

18 Employing a special technique no difficulty was experienced in obtaining yarns from mixtures of comber wastes and low quality cottons. In the case of three cottons the yarns spun from the mixtures were somewhat weaker than those given by the pure cottons showing that comber waste was poor in spinning quality than the pure cotton. In the fourth case the yarns spun from the mixtures were just as strong as those obtained from the pure cottons.

19 Only in the case of one cotton—P A 289F—the yarn strength results of the 30 per cent comber waste mixture were definitely better than those for the 20 per cent waste mixture. In the case of the other three cottons the differences in yarn strength between the two waste mixtures were generally not large.

(2) *Technological Bulletin Series B No 19 Effect of storage prior to ginning on the spinning quality of cotton*—The object of this paper is to describe the results of an experiment carried out specifically with the object of accepting the null hypothesis that there is no change in the properties of the cotton fibre during storage.

This question has already been traversed by other workers. The three cottons selected for these experiments are improved varieties grown in the Punjab and are called Punjab American 289F, Punjab American 4F and Mollisoni.

It was found that storage of cotton in conditions of temperature and humidity had no effect whatever either on the properties of the cotton fibre or on the seed-cotton. Similarly the other view that during storage oil diffuses from the seed into the fibre is not confirmed by the results of wax determination. Only in the case of one cotton P A 289F the wax content of the stored sample was found to be significantly higher than that of the unstored sample.

The results of the spinning test show that the yarns spun from the sample of P A 289F which was stored before ginning for four weeks were stronger and more even than those given by the early sample. This feature again was not shared by the other two cottons. The results for the two types of sample cotton—Mollisoni—where the stored sample had the advantage

Thus in the case of two cottons storage of seed cotton before ginning did not bring about any improvement whatever in fibre-properties wax content or spinning performance while it held the possibility of severe loss due to bacterial deterioration. In the case of one cotton only a small improvement in wax content and spinning performance was observed but it would be rash to regard it as an argument in favour of delaying the ginning operation and to ignore the harmful effects of storage upon the quality of the seed and lint. If by force of circumstances it may become necessary to store the seed cotton for a while before ginning every precaution should be taken to ensure that the sample is dry that it does not contain large quantities of dirt or trash and that the atmosphere in the store-room is neither particularly warm nor humid. If the period of storage should exceed a few weeks the seed cotton should be occasionally taken out and exposed to sun.

(3) *Technological Bulletin Series B No 20 Fibre Maturity in Relation to Fibre and Yarn characteristics of Indian cottons* —The present report contains an account of an investigation undertaken with the object of determining the effect of season locality of growth heredity etc on the fibre-maturity of Indian cottons the relationship of the latter with the mean length fibre weight per inch and fibre strength of these cottons and its influence on the neppiness and strength of the yarns spun from them.

The technique employed in these tests is described in detail. The following conclusions are drawn from an analysis of the observed data —

(1) Different cottons behave differently in regard to the effect of season on fibre maturity in some the maturity is subject to seasonal fluctuation in others the season has very little effect.

(2) The locality of cultivation has a pronounced effect on the degree of fibre maturity of Banilla cotton.

(3) Selections from the same common parents grown under similar conditions may differ significantly in regard to fibre maturity.

(4) The saw gun does not exercise any selective action on the immature or half mature fibres. If as in the present case the saw ginned samples are found to give more nappy yarns it is possibly due to the rolling up of the short bits into which some of the longer fibres may break during their passage through the gin.

(5) Fibre maturity did not yield a significant simple correlation with mean length but detailed analysis shows that a majority of short staple cottons possess high percentages of mature hairs while a majority of the comparatively long staple cottons are characterised by low percentages of mature hairs.

(6) High fibre maturity goes hand in hand with high fibre weight per inch and high fibre strength the simple correlation coefficients between the two attributes being +0.60 and +0.72 respectively. The mature fibres

SPINNING LABORATORY

Spinning Master—R P Richardson F T I

Spinning Assistant—N Iyengar

Electrician — Herculano Lobo L E E

Clerk—D. C. Mullan

Yarn Testing Section —

Statistician and Personal Assistant—V Venkataraman M A

Senior Testing Assistant—H B Joshi B Sc

Junior Testing Assistants—G D Bhide BSc K V N Nayar
N Modak BSc L V Sundararaman BA P S Sambamurthi G J
Kharkar BSc A J Fand U K Benegal BA P V Nachane BSc
A B Khan BSc

Statistical Clerks—R Krishna Iyer P K Wagle

DIRECTOR'S OFFICE

Head Clerk — M T Majmudar

Stenographers — M T Sundaram M A Marar

Laboratory Keeper — H P Sethna B Sc

Mr R P Richardson Spinning Master proceeded on leave out of India on the 10th September 1934 and returned to duty on the 11th January 1935. During this leave period Mr N Iyengar Spinning Assistant was appointed to officiate as Spinning Master.

Mr M M Patke Instrument Maker resigned his post from the 15th February 1935 and this post was filled up by the appointment of Mr J B Kharas on a revised scale of pay Mr Kharas joined the Laboratory on 18th February 1935

In order to cope with the increased work in the Fibre and Yarn Testing Department, Minor Testers were created up by Messrs G Hurry on 10th December 1934.

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Jun or Research Assistant on a revised scale of pay Dr Sen joined his duties at the Laboratory on the 17th May 1935

Mr K S Marar, Junior Tester, who was appointed Technological Assistant, Sakrand, was relieved on the 30th April 1935 to join his new post and his post was filled up by the appointment of Mr C S Ramanathan, who joined the Laboratory on the 4th June 1935

Mr K G Deo was transferred to Lyallpur as Officiating Technological Assistant to relieve Dr K R Sen. He worked there till relieved by Mr. S

G Deo, who reverted to his substantive post of Junior Tester in the Laboratory.

Mr M A Gangat, Junior Tester, resigned his post on the 22nd May 1935, who joined

In connection with the investigation on the possibility of the utilisation of short staple cottons for the manufacture of artificial silk and staple fibre, a temporary post of a Chemist was created for one year and Dr L Thotia was appointed to this post. He joined the Laboratory on the 1st May 1935.

As in the past, two students from outside, viz., Messrs P H Bhutta and V S Matkar were selected for training at the Laboratory from 1st December 1934 for a period of six months. Their period of training expired on the 31st May 1935.

During the period under review, the writer was elected a Fellow of the Institute of Physics, London, and a Fellow of the Indian Academy of Sciences Bangalore. He was also nominated by the Government of Bombay as a member of the Board of the Victoria Jubilee Technical Institute, Matunga, and a Fellow of the University of Bombay.

Mr D L Sen, Senior Research Assistant, was sanctioned by the Committee one year's study leave outside India and he left India on the 20th September 1935 to join the College of Technology, Manchester.

The temporary post of Personal Assistant was extended for a further period of one year and Mr V Venkataraman continued to hold that post in addition to his own duties.

Mr H B Joshi continued to be in charge of the Yarn Testing Section.

The Indian Central Cotton Committee at its meeting held on the 4th February 1935 while reviewing the work of the Laboratory desired that a brochure containing an account of the past work of the Laboratory be written up by the undersigned together with a programme of work for the future. The brochure and the programme were considered by the Committee at its

meeting held on the 20th August 1935 and it was decided that the brochure should be published for the information of the public

As in the past the Laboratory has continued to attract a large number of visitors. These included prominent men, people connected with the textile trade and industry, students of agricultural, commerce and technical colleges, etc. It may also be stated here that the Laboratory possesses a small but well equipped Library of its own. The Library contributes to most of the leading journals devoted to textile research and every effort is made to keep it up to date.

Equipment—During the period under review, the following machines and apparatus were added to the equipment of the Laboratory —

Machines —

- (1) Horizontal opener cleaner
- (2) Cage Exhaust
- (3) New Hopper Feeder with three step cone pulleys
- (4) Improved dust trunks with vibrating grids
- (5) Two cyclones

All the machines were supplied by Messrs Tweedales and Smalley (1920) Ltd, Castleton, Rochdale. In addition, the old hopper feeder has been provided with strong upright and evener lattices and the old Crighton opener with new triangular grid bars and new sets of blades. The scutcher has now been equipped with a variable speed motor in which the beater speed can be varied from 500 to 1000 r.p.m. Another important feature of the present blow room is the provision of a bye pass by means of which the Crighton opener can be thrown out in the case of clean cottons for which a milder blow room treatment is regarded sufficient.

- (6) Two new Electric motors one of 8½ H.P. and the other of 13 H.P. supplied by the Asea Electric Limited, Bombay
- (7) One Brunswiga Calculating Machine

Apparatus —

- (1) Single Yarn Twist Tester manufactured by the Fine Cotton Spinners' and Doublers' Association, Rock Bank, Bollington, Cheshire
- (2) One Strength Tester with graphic recorder manufactured by Louis Schopper, Leipzig, Germany, for artificial silk work
- (3) One Electric Oven by Messrs Baird and Tatlock (London) Limited

ACKNOWLEDGMENTS

In presenting this report I wish to express my gratefulness to the office-bearers of the Indian Central Cotton Committee for the deep and sympathetic interest they have uniformly taken in the work of the Laboratory, to the East India Cotton Association to Major Ellis Jones and Messrs C P Bramble and Varjivandas Motilal for the supply and valuation of samples and to the entire staff of the Laboratory for their loyal co-operation which made the work possible

NAZIR AHMAD,

Director,

Dated the 9th November 1935

Technological Laboratory

CHAPTER VII.

REPORT OF THE PUBLICITY AND PROPAGANDA OFFICER FOR THE YEAR ENDING 31ST AUGUST 1935.

INTRODUCTION

THE past year was one of sustained progress for the Propaganda and Publicity Department. The vital contact that the Department maintains between the activities of the Indian Central Cotton Committee on the one hand and the needs and interests of the cultivator, general public and government departments on the other was widened and deepened. The Department's activities were not exhausted by the publication and broadcasting of information. Important as this side of its activities was the more vital purpose was to act as a sensory nerve keeping in live touch with the increasing requirements of the cotton world, and assisting the Committee to direct its work along the most fruitful channels.

Cotton interests not only in India but those outside drew upon the resources of the Department and the contact established during the last few years between the Committee and organisations in England and Japan continued unbroken. Through this Department the efforts of the Lancashire Indian Cotton Committee to increase the off take of Indian cotton and thereby to promote the cotton trade between the two countries obtained wide publicity throughout India.

PINK BOLL WORM CONTROL EXTENSION CAMPAIGN IN THE UNITED PROVINCES

The most notable event during the period under report was the province-wide campaign conducted by the Publicity Officer for the extension of control measures of the pink boll worm a pest of cotton which in one year caused a loss of nearly 2½ crores of rupees to the crop in the United Provinces, and the enquiry connected therewith for the purpose of finding out what amount of cess should be levied to meet the cost of heating machines, their installation and working expenses, etc. The campaign extending over three months from the beginning of the year was preceded by two brief visits of a fortnight's duration each time paid to the experimental area with a view to study the effect of sun heating of the village stocks of cotton seed (*bimaula*) in the areas then under pink boll-worm control in the districts of Aligarh, Saharanpur and Bijnor and later on to see the results of the heating process at the commencement of the harvest. The decided superiority of the crops in the treated area over the adjacent uncontrolled area both in regard to the stand of the plant, the opening of the bolls and the quality and quantity of the lint produced, by comparing the yield per acre,

and the price realised convinced me of the efficacy of the method of sun heating the seed for completely destroying the pest which had resulted in a considerable improvement of the crop to the thorough satisfaction of the grower and of the vital necessity of extending the control measures

DEMONSTRATION AT THE COUNCIL HALL LUCKNOW

A noteworthy feature of the campaign was the staging of a special demonstration illustrative of samples of cotton which were supported and explained by printed labels charts and graphs relating to the scheme in the Council Hall of the Legislative Council of the United Provinces Considerable impetus to the focussing of attention of the members on the importance of adopting the scheme of Pink Boll Worm Control Extension was imparted by the organisation of demonstration on the 11th and 12th and again on the 20th of March at a time when the session was in progress The members were taken round the exhibits whereafter there was a conference The Pink Boll Worm posters in English Hindi and Urdu attracted much attention Questions relating to the loss caused by the pest and the striking gain that had resulted in the quality and quantity of *kapas* of the areas where control methods had been applied were freely asked and answered

In taking stock of the extensive and thorough propaganda campaign in the United Provinces which closed in the middle of April the following observations and accomplishments may be of interest —

- (1) Local interests all over the province were notified of my visit and a well planned propaganda campaign commencing several weeks in advance of my visit to the station was found most effective A circular letter stating the object of the campaign and the purpose of the enquiry connected therewith was mailed to all notable persons from the Entomologist's office at Cawnpore This made the task of organising province wide meetings and/or obtain personal interviews with the co-operation of the civil authorities more thorough Nothing was left to chance as regards eliciting the views of those I met Hundreds of meetings and conferences were held in townships and villages
- (2) In advance of and during the campaign there were sent out numerous circulars of informations giving facts regarding improvements carried out as the result of sun heating the seed and other information necessary A Pink Boll Worm Bulletin giving the main features of the scheme of extension was written incorporating control measures
- (3) A ten colour poster to further the campaign was likewise prepared About 5 400 leaflets and 1 400 posters were issued to growers merchants ginners and other men of influence

- (4) The campaign brought together men from all interests concerned with cotton industry and others indirectly allied with it with one object in mind and that is to protect the crop from the ravages of the pest and avoid the colossal preventable loss caused by it

Excellent co-operation was extended to the Publicity Officer by all interests concerned—the Department of Agriculture United Provinces *Zamindars* businessmen ginners and other allied interests. Newspaper publicity was carefully handled in order to prevent undue alarm in those districts of the province where propaganda in favour of the scheme had not been carried out. At the same time sufficient information was disseminated in the affected areas to focus attention and secure action from farmers whose crops were menaced and their representatives in the Legislative Council.

This vigorous Pink Boll Worm Extension Campaign has I think remarkably succeeded in bringing to the attention of the interests concerned and the public the real necessity of tackling the problem and the benefits which will accrue to the cotton crop of the United Provinces by so doing

A 46-page report of the tour and enquiry in the United Provinces has been submitted to the Government of the United Provinces. Copies were placed on the table for members information during the last half yearly meeting of the Indian Central Cotton Committee

PRESS COMMUNIQUÉS

During the year under report the Publicity Officer issued the following press communiqués —

- (1) *The Reports of the 29th and 30th meetings of the Indian Central Cotton Committee*
- (2) *Development of Cotton Growing in Sind*
- (3) *Development of Cambodia Cotton in Coimbatore District*
- (4) *Development of Cotton Cultivation in Central Provinces*

A press note was issued on *Facilities for training at L. T. I. Laboratory Matunga* to bring to the notice of Laboratory would admit this year two students of spinning and the routine methods of testing cotton fibre and yarn

- (5) *Combing of Good Quality Indian Cotton*
- (6) *Effect of Storage prior to Ginning on the Spinning Quality of Cotton*
- (7) *Development of Cotton Growing in the Bombay Presidency*

SPECIAL ARTICLES

The Publicity and Propaganda Officer has been sending out special articles to the press. These articles are in a language easily understood by the layman and contain much timely information. Through them the wider public is kept constantly in touch. The following articles based on literature already available were contributed and published —

- (1) *Problems of Cotton Growing in the Central Provinces and Berar* —
(Published in *Hitarada*, Nagpur, and the *Civil & Military Gazette*, Lahore)
- (2) *Improving the Indian Cottons* —(Published in *Textile Weekly*, Manchester)
- (3) *Improvement of Broach Cotton* —(Published in *Textile Mercury & Argus*, Manchester)
- (4) *Survey of Commercial Indian Cottons* —(Published in *Current Science*, Bangalore)
- (5) *Yarn Testing and Its Importance to Cotton Mills* —(Published in *Indian Textile Journal*, Bombay)
- (6) *High Draft Systems of Spinning and Their Importance to Trade* —
(Published in *Indian Textile Journal*, Bombay)
- (7) *Cotton—India's Greatest National Industry* —(Published in *Indian Textile Journal*, Bombay)
- (8) *Promotion Activities with Respect to India's Cotton Production this Year and thereafters* —(Published in *Cotton Trade Journal*, America)

The last article formed a special feature of the Annual International Edition of the *Cotton Trade Journal*, America. This is creditable inasmuch as the journal is the foremost cotton journal in the world.

PAMPHLETS

The Publicity and Propaganda Department continued to regard as its prime function the dissemination of the results of scientific cotton research through the medium of publications and distribution of publicity literature—pamphlets, leaflets, handbills and articles to the press. During the period under report the following pamphlets and leaflets were issued —

- (1) *Pink Boll Worm Pest of Cotton and How to Control It* —This is an illustrated, ^{small}
prepared for ^{the}
the pink boll

the injurious to the cotton
insects in the month Pachydrus gossypii
and the seed made the cotton

2. The 20th January Meeting of the

21. The 21st December and How to
control them - the vernaculars, Hindi
and English in the United Provinces. They
were Roll-Worm Control Campaign

22. 22. Cotton Crop Survey - Promotion of
American cotton (4F 18)
23. In the Indus under perennial
Rainfall the Ratoor Canals has been going
on for the Publicity and Propaganda
24. The Central Cotton Committee had a large
local propaganda effort by suggesting
various pamphlets and by supplying
them to begin the end in view
25. It has rendered considerable

1. 26. The Progress Report for the year
1951-52 of the Crop and Extension Scheme says
that in Hindi and English designed and
published by the Indian Central Cotton
Committee in the tract A
for the Right Bank Area
of the Indian Central Cotton
and Agricultural Officer in
charge fares
very good
from
now

with cut back of 3 tons—one stained and the other of good quality, inflicted by the pink boll worm. There are two bolls in the cotton grown between the two cultivars and the borer and the other pest draws attention to the urgency of heating the cotton seed in a furnace so as to simplify

Hindi and Urdu versions of the poster have also been prepared. Photo copies prints of the poster on "The Pink Boll Worm Pest of Cotton" prepared for the campaign in the United Provinces were also sent to the press in Hindi and English.

A Telugu version of the poster "India's Role in Supplying to World's Cotton Markets" was printed for use in the Madras Presidency. The poster deals with the export figures of cotton and emphasises the national and international importance of the commodity.

EXHIBITIONS

The Department participated in

- (1) The *Exhibition at Nizam* organised by the Agricultural Department, Hyderabad State, on 30th November and 1st December 1941.
- (2) The *Kelkarji Fair* which was held in the 2nd week of May 1941.
- (3) The *All India Exhibition* which commenced on the 18th of December 1941 in Lahore.
- (4) The Agent, Japan Cotton Spinners Association, Bombay asked for photographs and models showing the various activities of cotton agriculture in India as also the activities of the Indian Central Cotton Committee's Technological Laboratory at Mysore. He further requested for pamphlets for the dissemination of which the information bearing on problems which the Committee was tackling and peculiar to use at the *Memorial Exhibition of Cotton (Japan)*. In addition to the supply of publications and posters he was provided with a number of large size photos on the different sections of the Technological Laboratory.

HEAVY DEMAND ON PUBLICITY LITERATURE

There is a constant demand
and although supplies are some
beaten and other publications
In addition to the heavy demand on publicity literature from all over India
we have received from abroad. Mr A R

requested a supply of all illustrated pub-
lications from India to help him in preparing history

slides for a series of lectures he was going to deliver. The Chief, Periodical Division, U S Department of Agriculture Library, Washington, requested for press communiqués for 1933-34 and other publications of the Department.

APPRECIATIVE REFERENCE TO THE COMMITTEE'S PUBLICITY WORK

"The Indian Central Cotton Committee maintains its excellent work", comments the British Cotton Growing Association in their 13th Annual Report (1934), "and several matters of great importance to the industry in India have engaged its attention during the past year. The various reports issued by its Publicity Officer have contained information of much interest and have done good propaganda work in disseminating scientific and practical information relating to the improvement of cotton in India . . . etc."

R D MIHRA,
Publicity & Propaganda Officer

APPENDIX I.

MEMBERS OF THE COMMITTEE

(1) PRESIDENT.—

Dewan Bahadur Sir T. Vijayaraghavacharya, K.B.E., Vice-Chairman, Imperial Council of Agricultural Research, *ex-officio*

(a) The Expert Adviser to the Imperial Council of Agricultural Research in Agricultural matters, *ex-officio*

(2) REPRESENTATIVES OF AGRICULTURAL DEPARTMENTS.—

Madras .. .	M R. Ry Rao Bahadur D. Ananda Rao Garu, I.A.S.
Bombay	The Director of Agriculture
United Provinces	Mr R G Allan, I.A.S., Director of Agriculture
Punjab ..	Mr H. R. Stewart, I.A.S., Director of Agriculture
Central Provinces	Mr J. H. Ritchie, I.A.S., Director of Agriculture
Burma ..	Mr F. D. Odell, I.A.S., Deputy Director of Agriculture, West Central Circle, Magwe

(3) THE DIRECTOR-GENERAL OF COMMERCIAL INTELLIGENCE AND STATISTICS, *ex-officio*

(4) REPRESENTATIVES OF CHAMBERS OF COMMERCE AND ASSOCIATIONS.—

The East India Cotton Association ..	Sir Purshotamdas Thakurdas Kt., C.I.E., M.B.E., (<i>Vice-President</i>)
The Bombay Millowners' Association ..	Mr S. D. Saklatvala, M.L.C.
The Bombay Chamber of Commerce	Mr A. A. Sarantides
The Indian Merchants' Chamber	Mr Chunilal B. Mehta
The Karachi Chamber of Commerce ..	Mr G. C. R. Coleridge
The Ahmedabad Millowners' Association ..	Seth Sakarlal Balabhai, M.L.C.
The Tuticorin Chamber of Commerce ..	Mr J. Vonesch
The Upper India Chamber of Commerce	Mr J. Tinker
The Empire Cotton Growing Corporation	Mr W. Roberts, C.I.E.

(5) and (6) COMMERCIAL REPRESENTATIVES NOMINATED BY LOCAL GOVERNMENTS.—

Central Provinces	{ Mr Y. G. Deshpande Rao Bahadur G. R. Kothare, M.L.C.
Madras	Mr J. Nuttall
Punjab	Khan Bahadur Sardar Habibullah, M.L.C.
Bengal	Mr Akhil Bandhu Guha

(7) CO-OPERATIVE BANKING REPRESENTATIVE.—

Rao Bahadur M. G. Deshpande, C.B.E.

(8) REPRESENTATIVES OF COTTON-GROWING INDUSTRY —

<i>Madras</i>	{ Mr K. S. RamaSwami Gownder M.R.Ry Rao Bahadur B P Sesha Reddi Garu, M.L.C.
<i>Bombay</i>	{ Sardar Rao Bahadur Bhimbhai Ranchodji Naik, M.L.C. Rao Bahadur C. S. Shirahatti.
<i>United Provinces</i>	{ Khan Bahadur Shah Nasar Hesain M.L.C. Rai Bahadur Lala Anand Sarup M.L.C.
<i>Punjab</i>	{ Sardar Sampuran Singh, M.L.C. Mian Narullah, M.L.C.
<i>Central Provinces and Berar</i>	{ Mr N. M. Deshmukh, Mr J. B. Deshmukh

(9) and (10) REPRESENTATIVES OF INDIAN STATES —

<i>Hyderabad State</i>	Mr Nizam ud Dun Hyder Director of Agriculture.
<i>Baroda State</i>	Mr C. V. Sane Director of Agriculture.
<i>Gwalior State</i>	Mr H. H. Pandya Director of Agriculture
<i>Rajputana and Central India States</i>	Mr F. K. Jackson Director Institute of Plant Industry Indore

(II) ADDITIONAL MEMBERS NOMINATED BY THE GOVERNOR-GENERAL IN-COUNCIL —

- 1 Mr D. N. Mahta Economic Botanist for Cotton Central Provinces
- 2 Rao Bahadur S. S. Salmath Deputy Director of Agriculture Southern Division Dharwar
- 3 Dr V. K. Badami 1st Deputy Director Department of Agriculture in Mysore State Bangalore
- 4 M. R. Ry & Ranamalai Ayyar Asst. Cotton Specialist Coimbatore.
- 5 Musahib Ali has Balalpur S. V. Janmungo Finance Minister Holkar State Representative of the Holkar State
- 6 Mr K. I. Thadani Botanist in Sind Agricultural Research Station Sakrand
- 7 Seth Isserdas Varindmal Representative of the Karachi Indian Merchants Association
- 8 Mr P. B. Richards I.A.S. Entomologist to Government United Provinces.
- 9 Khan Bahadur Nawab Fazl Al Khan Chairman District Board and President Central Co-operative Bank Ltd. Gujarat (Punjab)
- 10 Khan Saheb Farrukhbeg Sad khalibeg Mirza Nawabshah Sind
- 11 Lala Shri Ram Representative of the Cotton Millowners of Delhi
- 12 Mr Chellaram Shewaram Representative of the Karachi Cotton Association Ltd

APPENDIX II.
CONSTITUTION OF SUB-COMMITTEES

STANDING FINANCER SUB-COMMITTEE

Dewan Bahadur Sir T Vijayaraghava charya (<i>Ex-officio</i>)	Mr J Vonesch
Sir Purshotamdas Thakurdas (Chairman)	Mr Chunilal B Mehta
Mr S D Saklatvala	Mr G C R Colendge
Sardar Rao Bahadur Bhimbbhai Ranchodji Naik	Rao Bahadur G R Kothare
	Mr A A Sarantides

LOCAL SUB-COMMITTEE.

Dewan Bahadur Sir T Vijayaraghava charya	Mr J Vonesch
Sir Purshotamdas Thakurdas	Mr Chunilal B Mehta
Mr S B Saklatvala	Mr G C R Colendge
Sardar Rao Bahadur Bhimbbhai Ranchodji Naik	Rao Bahadur G R Kothare
	Mr A A Sarantides

COTTON GINNING AND PRESSING FACTORIES SUB COMMITTEE

Sir Purshotamdas Thakurdas	Mr G C R Colendge
Mr S D Saklatvala	Mr J Nuttall
Mr J Vonesch	Mr W Roberts
Mr Chunilal B Mehta	Mr Y G Deshpande Vacant (two places)

The Co-operative Representative—Rao Bahadur M G Deshpande and
Mr Chellaram Shewaram—(*Co-opted Member*)

AGRICULTURAL RESEARCH SUB COMMITTEE

- I *The President*—Dewan Bahadur Sir T Vijayaraghavacharya (*Ex-officio*)
- II *The Vice President*—(*Ex officio*)
- III *The Director Institute of Plant Industry*—Mr F K Jackson (*Ex-officio*)
- IV *The Co-operative Representative*—Rao Bahadur M G Deshpande (*Ex-officio*)
- V *Cotton Growers Representative*—Mr W Roberts

- VI *Cotton Trade Representative*—Rao Bahadur G R Kothare (Co-opted for the August 1935 meeting)
- VII *Four Agricultural Officers*—Mr B S Patel Mr J H Ritchie Mr H R Stewart Mr V Ramanatha Ayyar
- VIII *Additional Members*—Mr B C Burt Mr R G Allan Mr K I Thadani (Co-opted for the August 1935 meeting) Rao Bahadur D Ananda Rao Garu (Co-opted for the August 1935 meeting) Mr D N Mahta Mr P B Richards Mr C V Sane Mr Chunilal B Mehta Mr Nizam ud Din Hyder Mr H H Pandya
- IX *Co-opted Members*—Mr Mohammad Afzal Rai Sabeh Kalidas Sawhney Mr J B Hutchinson
and
X *The Secretary*

TECHNOLOGICAL RESEARCH SUB COMMITTEE

The President (<i>Ex officio</i>)	Mr Chunilal B Mehta
Sir Purshotamdas Thakurdas	Seth Sakarlal Balabhai
Mr B C Burt	Mr J Tinker
Mr B S Patel	Mr A A Sarantides
Mr H R Stewart	Mr Y G Deshpande
Rao Bahadur D Ananda Rao Garu	Lala Shri Ram
Mr S D Saklatvala	Dr Nazir Ahmad
Mr A D Walwyn Mr Dharamsi Mulraj Khatau (Representing the Bombay Mill owners Association)	
Mr Kasturbhai Lalbhai Seth Chamanlal G Parekh (Representing the Ahmedabad Millowners Association)	
Mr R G Saraiya Mr Jamnadas Ramdas (Representing the East India Cotton Association Ltd)	
Seth Isserdas Varindmal (Representing the Karachi Cotton Association Ltd)	

RESEARCH STUDENTS SELECTION SUB COMMITTEE

The President	Mr F K Jackson
The Vice-President	Mr C V Sane
Mr B C Burt	Mr H H Pandya
Mr B S Patel	Mr Nizam ud Din Hyder
Mr H R Stewart	Dr Nazir Ahmad
Mr J H Ritchie	The Mysore Representative (Dr V K Badami) and
Mr R G Allan	
Mr P B Richards	Vacant (two places)

SUB COMMITTEE ON MALPRACTICES

Sir Purshotamdas Thakurdas.
 Mr B S. Patel
 Mr G C. R. Coleridge
 Mr Chunilal D Mehta.

Sardar Sampuran Singh
 Seth Sakarlal Balabhai
 Seth Isserdas Varindmal
 Vacant.

COTTON FORECAST IMPROVEMENT SUB-COMMITTEE

The President.

The Director-General of Commercial Intelligence and Statistics Calcutta

The Director of Agriculture Bombay Presidency

Do	do	Punjab
Do	do	Madras
Do	do	United Provinces

The Chief Agricultural Officer in Sind

The Director of Land Records Central Provinces and Berar

The Director of Agriculture Daroda State

The Director of Statistics H E H the Nizam's Government

The Deputy Director of Statistics Calcutta

SPECIAL SUB COMMITTEE ON WIDER MARKETS FOR INDIAN COTTON

The President
 The Vice-President
 Mr B C Burt
 Mr H R. Stewart
 Mr J H Ritchie
 Mr B S Patel
 Mr S D Saklatvala
 Mr J Vonesch.
 Mr Chunilal D Mehta
 Mr Y G Deshpande

Mr R G Allan
Khan Bahadur Sardar Habibullah
Sardar Rao Bahadur Bhambhani Ranchodji Naik
Rao Bahadur D Ananda Rao Garu (Co-opted for the August 1935 meeting)
Mr Nizam ud Din Hyder
Mr V A Tamhane (Co-opted for the August 1935 meeting)
Mr Kasturbhai Lalbai Mr R. G Saraiya (Co-opted)

STANDARDS SUB-COMMITTEE

Dr Nazir Ahmad (Representing the Imperial Council of Agricultural Research)

Mr Haridas Madhavdas Mr Varjiwandas Motilal (Representing the East India Cotton Association, Ltd)

Mr M Napier, Mr Nechaldas Chhangomal, (Representing the Karachi Cotton Association, Ltd)

Mr N M Deshmukh, Rao Bahadur G R Kothare, (Representatives of cotton growers of Berar Tract)

Mr Humatilal Jagjuwandas Vadodana, Mr Vadilal Chunilal Doshi, (Representatives of cotton growers of Mathia Tract)

Mr Akhuhava Takatsinghp Chudasama, Rao Saheb Kevalbhai Desai (Representatives of cotton growers of Dhollera Tract)

Mr Haribhai Jhavembhai Amni Mr Ardeshar Jamshedji Kapadia (Representatives of cotton growers of Broach Tract)

Sardar C B Naik Bahadur Desai Rao Bahadur B L Pathi, (Representatives of cotton growers of Kumpta Tract)

APPENDIX III.

LIST OF RESOLUTIONS.

" That the International Federation of Master Cotton Spinners' and Manufacturers Associations be informed that the rule on the representation of the East India cases of hardships and losses incurred rejected in arbitration for faults in marking of marks

" The Indian Central Cotton Committee recommends that a minimum balance should be maintained, and that it be Rs. 9 lakhs. There should be no objection, however, to draw upon this maximum balance in case of emergency, provided such shortages are made good as soon as conditions improve"

" The Indian Central Cotton Committee requests the Government of India to take immediate steps to amend the Cotton Ginning and Pressing Factories Act No. 12 of 1925 so as to protect the interests of the cotton growers in all respects"

" The Indian Central Cotton Committee wishes to place on record its sense of appreciation of the services rendered by Major W. Ellis Jones, extending over a period of ten years, in connection with the grading and valuing of cotton samples received for tests at the Technological Laboratory, and regrets that circumstances now compel him to relinquish this work "

" The Indian Central Cotton Committee requests the Government of India to take immediate steps to amend the Cotton Ginning and Pressing Factories Act No. 12 of 1925 so as to protect the interests of the cotton growers in all respects"

" Will -

Organised marketing

"That in view of the fact that the scheme of work on spotted boll worm control terminates in June 1938, the Central Cotton Committee desires to emphasise the necessity of legislative sanction being obtained before that date to enable the uprooting of cotton stalks to be enforced."

"The Indian Central Cotton Committee was established in 1914 - as a committee

"The Indian Central Cotton Committee regrets that the Government of India have not yet passed any orders on the unanimous Resolution of the Committee recommending to the Government of India to resume the broadcasting of cotton rates and hopes that the practice of broadcasting cotton rates will be resumed as soon as possible."

"The Indian Central Cotton Committee welcomes the decision of the
the Bombay Government that
Committee is convinced that
cotton will spread rapidly in
F cotton to the detriment of

"The Indian Central Cotton Committee at which Sir T efficient manner in which Sir for six years His consistent patience in dealing with the have been an asset to the Committee

"The Committee records its best thanks to Sir T. Vijayaraghavacharya for the continued close attention he gave to details of the questions disposed of during this period and it tendered him its best wishes on the eve of his retirement."

APPENDIX IV.

INSTITUTE OF PLANT INDUSTRY, INDORE, CENTRAL INDIA

Annual Report for the year ending June 30th, 1935

The Institute of Plant Industry is a Society registered under the Holkar State Societies Registration Act and its primary objects are —

- (a) The investigation of all matters relating to the production and improvement of raw cotton in India.
- (b) The agricultural development of the Indian States which are members of the Society
- (c) The training of officers and cultivators nominated by such States
- (d) The training of advanced students nominated by the Indian Central Cotton Committee

Its funds are derived entirely from subscriptions. In the financial year 1934-35 the Indian Central Cotton Committee made a grant of Rs 1,15,000 and the member States in Central India and Rajputana subscribed Rs 61,050.

The Institute is subsidised by the Indian Central Cotton Committee primarily in order that —

Rajputana

The interests of the member States lie in the investigation of the specific crop problems of their own territory and in the development and dissemination of better seeds and more efficient agricultural practices.

The interests of the Indian Central Cotton Committee and of the member States are complementary and provide a very satisfactory balance to the work of the Institute.

ADMINISTRATION AND GENERAL

1 General and Board of Governors Meetings — A General Meeting of Members of the

2 Contributing Members of the Institute — During the year the State of Jhabua in Central India and the Thikanas of Khetri in Jaipur and Bagh in Gwalior became members. One State, Jhalawar, has temporarily withdrawn from membership for financial reasons.

At the closing date of this report the following twenty-three States and Thikanas were members of the Institute, arranged in order of joining —

Indore	Tonk	Orchha
Dhar	Bijawar	Bharatpur,
Jaora	Barwani	Jodhpur
Datia	Bikaner	Alwar
Rutlam	Rewa	Khetri
Dewas (Senior Branch)	Jaipur	Bagli
Sitamau	Bandi	Jhabua
Narsingarh	Partabgarh	

The financial situation having become somewhat easier in most States and the Institute's reputation having grown, it is satisfactory to record rather numerous enquiries from States which are not yet members.

On the other hand the Indian Central Cotton Committee, faced with the exhaustion of its accumulated reserves, has found itself unable to continue to sanction annual grants of Rs 1,15,000 and the Institute's annual income from this source will now be reduced by Rs 15,000. This serious situation can only be met by further contributions from States or by the dismissal of personnel which will reduce the output of research work.

3 *Staff and Students* — The Director was absent on leave from March 10th, 1934, to October 18th, 1934, and the Geneticist and Botanist officiated during that period.

The post of Senior Botanical Assistant was filled after advertising it, by the promotion of Mr R L M Ghose, M Sc., who had been Botanical Assistant for some years.

For lack of funds a number of sanctioned posts cannot be filled.

Mr G G Phadke, L Ag., Junior Farm Assistant, remained on deputation ^{as} Agricultural Officer to Bharatpur State.

It is a pleasure to record the keenness and enthusiasm of personnel in all Sections.

4 *Visitors* — On the 26th July, 1934 the Institute was honoured by the visit of Their Excellencies Sir George and Lady Beatrix Stanley, Viceroy and Vicereine, who spent an hour examining in detail some of the more important of the Institute's achievements and the work in progress.

Among other visitors were the following —

Amar Singh, Kunwar of Jasol, Director of Agriculture and Grass Farms, Jodhpur State

Anderson, Jane (Miss), Mission Hospital Indore

Ardesher, Major, D K, M R C S., Mhow, C I

Armstrong Dr Allan E., Secretary, United Church of Canada Mission, Toronto, Canada.

Augier, D E, O B E, Joint Opium Officer Malwa States and Assistant Opium Agent, Neemuch, C I

Basu S., Meteorologist, Poona

Ben, Mira (Miss), Wardha.

Bhandari, K L, Rai Babadur, Managing Director, Nandlal Bhandari Mills, Indore

- Bree P G I.C.S. Excise and Opium Commissioner in Central India and Adviser on Opium Affairs in Rajputana Indore
- Burnett Major R R C I cI Adviser Tonk State Rajputana
- Caswell K (Miss) Mission Girls High School Indore
- Chatterjee Rev J C Superintendent of Education Dell: Ajmer Merwara and Central India.
- Crofton R M I.C.S. Excise and Opium Commissioner in Central India and Adviser on Opium Affairs in Rajputana Indore
- Davies P Consulting Engineer Holkar State
- Desai Mahadev Vaganwadi Wardha
- Devisingh Thakur Lt-Col Raz Bahadur Singha Member Jipur
- Dhanda Captain H C Deputy Commissioner Commerce and Industry Holkar State Indore
- Dodds J L (Mr and Mrs) American Presbyterian Mission Dehra Dun U P
- Fatehuddin Chowdhri Khan Bahadur Offg Director of Agriculture Punjab Lahore
- Foster A R Imperial Chemical Industries (India) Ltd Calcutta
- Gandhi M K Wardha.
- Ghosh Hanjban MA Professor and Head of the Department of English Holkar College Indore
- Gulamali Huzur Secretary to His Highness the Nawab of Jaora C I
- Hardy M F D Sc Private Secretary to His Highness the Maharaja Holkar
- Hill, M (Miss) Toronto Canada
- Hilliard D (Miss) Mission Hospital Indore
- Holkar Malhar Rao Sardar Ada Bazar Indore
- Holkar Her Highness the Maharani Indore
- Hutchinson E (Miss) Pemba Zanzibar
- Kale Dinkarrao Sardar Dewas (Senor)
- Kanungo Musahib Khas Bahadur S V MA Finance Minister Holkar State Indore
- Karmarkar D V M Sc Ph D A I S C Cold Storage Research Scheme Poona
- Khan Sarfaraz Ali Khan Baladur Chief Secretary Jaora C I
- Khasgiwala Fatehmal Agricultural and Treasury Officer Partabgarh (Rajputana)
- Kirpalani Capt J K I M S (Retired) Indore
- Kothare Rao Bahadur G R M L C Member Indian Central Cotton Committee Khamgaon Berar
- Lalbhai Seth Kasturbhai Ahmedaba I
- Langar Pandit M M Diwan Jhalawar State Rajputana
- Macnabb Lieut Colonel R J I A Agent to the Governor General in Central India Indore

- Mahendra Singh, Thakur, Revenue Member, State Council, Bundi (Rajputana)
- Mash, Kenneth B V, Christian College, Indore
- Mehta, Chunilal B, Member, Indian Central Cotton Committee, Bombay.
- Mukerjee, R K, Professor and Head of the Department of Economics and Sociology, University of Lucknow, U P
- Mukerjee, W, Allahabad Agricultural Institute, Naini
- Myers, A J W, Hartford, Connecticut (USA)
- Nadkarni, Dewan Bahadur K, Dewan and President, State Council, Dhar, C I
- Naik, Bhumbhai, Sardar Rao Bahadur R, MLC, Member, Indian Central Cotton Committee, Surat
- Narsingarh, His Highness the Maharaja of
- Natu, R S, B S E, Divisional Engineer, Yeshwant Sagar Works, Indore
- Orchha, His Highness the Maharaja of
- Parekh, Manilal, Rajkot Kathiawar
- Patterson G (Miss), United Church of Canada Mission, Kharua, C I
- Patwardhan, K A, M Sc, Master, Daly College, Indore
- Pearce F G, Principal, The Scindia School, Gwalior
- Pearson D (Miss), Mission Girls' High School, Indore
- Prabhunath Singh, Maharaj, Narsingarh, C I
- Prayag Rao Sahib C H, Cotton Breeder, Jalgaon
- Rajkumar Singh, Managing Director, Rajkumar Mills Indore C I
- Rama Reddi, P H, MA, B Sc, I A S, Secretary Indian Central Cotton Committee, Bombay
- Ram Prasad Singh Rai Sahib, Thakur, Economic Botanist United Provinces Government Cawnpore
- Reenich, E de C (Miss), Companion to Her Highness the Maharani, Rewa, C I
- Reshamwale Gopal Rao Sardar, Indore
- Roberts Sir James R, Special Member, Council of State, Dewas (Senior) C I
- Roberts, Lady, Dewas (Senior) C I
- Sardar Kurganji A, MA, I E S (Retired) Late Inspector of Schools, Nerbudda Circle, C I and Southern Division, Bombay
- Sajjan Singh, Narsingarh, C I.
- Sanghi, M G, Jodhpur (Rajputana)
- Sanghi, S G, C/o Sanghi Bros, Indore, C I
- Scott, Rev A A, Principal Christian College, Indore
- Schneider, B H, Dr (with a party of 25 students), Allahabad Agricultural Institute, Naini.

Short, H C., Commissioner in India, Lancashire Indian Cotton Committee
 Sully, T. D., Principal, St. John's College, Agra.
 Talcherkar, V. A., late Textile Expert to the Holkar Government, Indore
 Taore, K. A., Dr., Dewas (Senior), C I
 Taylor, Rev. J. T., United Church of Canada Mission, Indore.
 Taylor, Rev. H E., United Church of Canada Mission, Indore
 Thakurdas, Sir Purshotamdas, Kt., C.I.E., M.B.E., Vice-President, Indian Central Cotton Committee, Bombay
 Trench, C. G., Chenevix, C.I.E., I.C.S. (Retired), Revenue Commissioner, Udaipur, Mewar.
 Vijayaraghavacharya, Dewan Bahadur Sir T., K.B.E., Vice-Chairman, Imperial Council of Agricultural Research, Delhi, President, Indian Central Cotton Committee
 Wither, C. (Miss), Mission Hospital, Indore
 Zalai Singh, Sardar, Kamavidar, Dewas (Senior), C I
 Zutahl, Dewan Bahadur B N., Vice-President, State Council, Rewa, C I

5 Library.—Accessions during the year were thus:—

Text-books and works of reference	71
Volumes of Journals	193
Reports, Bulletins, etc	546
Total accessions	810

Six new journals have been added to the list of periodicals taken by the Library. Loans of 182 books and journals were made to cotton research workers and others and to libraries in India and abroad. No less than 1,690 volumes have been issued during the year, the total number in force being over 10,000. The library has been strengthened by the addition of new books and periodicals.

RESEARCH WORK

6 Organization—There is little new to record under this heading, the extra facilities provided mentioned in the last report have been fully utilised with increased output of work and efficiency. A still larger number of field trials have been handed over to the Farm Section for execution so freeing research staff for other work.

The methods referred to in the 1934 report of central control of field experiments in out-stations have proved themselves and have been expanded, by their aid a very large mass of information of known accuracy has been acquired.

Once again the cordial co-operation of the States' Darbars and their officers as well as no small number of voluntary workers, must be acknowledged. With this aid much more rapid progress is made possible.

Similar acknowledgment is also due to the Provincial Departments of Agriculture, notably those of Bombay, the United Provinces, the Central Provinces, the Punjab and Madras for much assistance and co-operation willingly rendered, also to Agricultural

Departments in the United States of America, Australia, South Africa and other parts of the Empire and to officers of the Empire Cotton Growing Corporation

7. Weather and its effect on crops.—In Malwa, following a *rabi* season of low rainfall the 1934 monsoon was recorded, the yearly *kharif* crops on the *tinuity* of the whole g also did

Rajp the Gran the *Cotton* districts was cut to the ground and abandoned. Severe hailstorms harmed *rabi* crops in East Central India

8 Cotton—Botany and Genetics

(a) Botanical Survey of cottons in Malwa and Nimar.

A draft paper on the *botanical classification of cotton* with special reference to Asiatic species has been written and awaits the verification of a few small points at the Herbarium, Royal Botanical Gardens, Kew. This paper deals with botanical principles only.

The analysis of the survey of Malwa and Nimari cottons is at present being written up. It is hoped in this paper to indicate the possibilities and limitations of an agricultural classification

Useful information has been obtained and valuable types have been selected from a collection of Burma and Assam types obtained through the good offices of the Hon'ble the Agent to the Governor-General in Central India

(b) Genetics.—The study of X-rayed material yielded negative results. Some indications of cytological abnormality were noted but on further investigation they proved to be of small importance. This line of work has been suspended in favour of lines of more immediate value.

Work on the inheritance of major factors

Work on the inheritance of quantitative characters has now become the main part of the genetics programme. The results obtained by the improved technique (see below under statistics) developed in the season under review have been very encouraging indeed

and indicate that modern statistical principles are capable of providing a solution to what has in the past been one of the chief difficulties in the study of quantitative inheritance, namely the control of environmental variation. Work is proceeding in three main lines:

- (i) The study of genetic variance in relatively uniform material. This has led to the discovery that considerable further improvement is possible in both Malvi 1 and Malvi 9 and also that Malvi 9, which is the better of the two, is also the one which is capable of the greater further improvement. Variation between strains in susceptibility to wilt has been observed in Malvi 9 and has provided an opportunity of studying the inheritance of this character.
 - (ii) The study of genetic variance in crosses between three important agricultural types of *G. arboreum* (Malvi, Iami and Roseum). It is intended in these crosses to study particularly the relation between characters of commercial importance and those responsible for the morphological differences between the types. Some information is already available concerning the extent to which the following characters are heritable:
- | | |
|-------------------|---|
| gical char- | . |
| work link- | . |
| morpholo- | . |
| delimiting | . |
| <i>G. arbore-</i> | . |
| lem of co- | . |
| characters | . |
- (iii) The study of genetic variance in interspecific crosses.

Work on this subject was started in 1933 and F₁ and backcrosses will be grown in the coming season. The programme has been enlarged and intensified in response to the need of plant breeders for information on this very obscure subject.

Study of the rate of mutation in mutable strains is proceeding slowly as mutable strains do not grow well in black soil. The occurrence of somatic mutation from brown to white lint (KK to kk) has, however, been demonstrated in heterozygous material.

(c) *Cytology*—Cytological work has demonstrated that in one of the two sterile mutant strains sterility is not due to cytogenetic abnormality. The inheritance of sterility in this type remains obscure. The other strain has been shown to carry a simple mendelian recessive factor for sterility. The cytology of the sterility in the mendelian recessive is now being studied.

The study of hybrids between *G. africanum* (=*G. Anomalum*) and cultivated Asiatic cottons continues, and second backcross seedlings are now being raised. It appears that the normal chromosome complement of all plants so far studied is 26, but certain plants contain small "islands" of tetraploid tissue.

(d) *Physiology*—The study of hair growth has been slowed down pending receipt of the new tester designed by Dr. D. S. Bhatia, Cytogenetics Laboratory, Matunga, Bombay. The study of numbers of small samples is proceeding from fibre tests appears to be almost 50 per cent by spinning tests.

(e) *Selection and Breeding*—The amount of seed of Malvi 1 and Malvi 9 available for distribution has been increased to meet the need which destroyed the crop in the Deccan and far beyond and owing to the oilseeds and regions.

A number of new selections from Malwa will be tested in replicated progeny rows this season, and desirable progenies will be carried on and tested against the existing strains.

Selection work on Malwa Upland cotton has been transferred to Badnawar (Dhar State) in the best Upland cotton growing district in Malwa

At Dhar, progeny row selection has been initiated in a mass selected Malvi cotton maintained by the Agricultural Department, and in the Nimar tract of Dhar State selection in the local Niman bulk has given an immediate improvement of considerable magnitude.

Thanks to the co-operation of the Agricultural Department, Dhar State, it has been possible to carry out the breeding work in all three of these centres by the replicated progeny row technique developed at the Institute.

West African Health Organization of Pan-African Peoples HV

(f) *Variety Trials*—A large number of variety trials were carried out in the period under review. The potentialities of existing selected varieties for the different tracts of Central India and Rajputana are now fairly well known, and may be summarised as follows:

(1) Black soil tracts of Central India (Malwa plateau)

(a) Malvi 1 and Malvi 9 yield about 20 per cent more than the local mixture. Malvi 9 gives 32.34 per cent as against about 28 per cent in local. Malvi 9 spins about 40 per cent higher counts than local.

(iii) $\text{Opentype} + \text{bold}$ gives me the top $\Delta h = 2_{\text{bold}} - 0_{\text{normal}}$

(2) *Nimar tract*—Banila will give the cultivator an immediate increase in return on account of its higher gleaning percentage. Verum is lower yielding than the local mixture, but would pay if pooling and marketing facilities were provided.

(3) Gang Canal Colony, well and tank irrigated sandy lands in Rajputana:

Cawnpore 520 is a definite improvement on Mollisoni in the Gang Canal Colony, and will probably pay better than local on most irrigated sandy lands. Rosea Bhatia has given very high yields in Rajputana, but is very poor in quality. It is rather doubtful whether American types have any permanent place in Rajputana.

(4) *Bundelkhand*—The extension of cotton in this tract would be of very doubtful value. Yields in all trials carried out for the Institute have been extremely low owing to heavy boll shedding after untimely rains, and Pink bollworm attack. No recommendation can be made.

9 Cotton—Physiology, Pathology and Agronomy—A very large amount of data of varied character has been accumulated and is being reviewed. The following summary deals with only a small fraction of it.

(a) Bio-chemical studies on Wilt.—Indications from the previous year's work regarding root relationships were confirmed thus—

(i) In the course of root studies together with the whole of it is being made to trace the course amply confirmed that the presence death, or even to any wilting no fungus could be found.

Further examination of the root systems of pairs of healthy and wilted plants again showed less root activity in diseased plants than in healthy ones. A more detailed examination is being made, some of the results of which are tabulated.

TABLE 1.—Root activity of healthy and wilted cotton plants in relation to soil zones, 1933-34

Average lengths in inches of active roots of Malvi Cotton

(Based on root exposures of 21 plants).

Soil zones.	Healthy	Wilted	P
0-9"	37.1	15.3	< 0.01
9"-18"	17.4	6.3	< 0.05 > 0.02
18"-downwards	16.6	8.0	> 0.05

Note.—

It seems that this weakening of root activity is located in the upper soil zones and it is from them that the plant's nutrition is chiefly derived. It appears that this is a concomitant of wilt.

(ii) Last year's observations on the periodicity of virulence were further extended and amplified. Periodicity in virulence is now established. This data is being examined in greater detail.

re determined plants

TABLE 2.—Means percentage moistures in soils around the roots of healthy and wilted cotton plants

A TOTAL MOISTURE¹

Depth of soil	Healthy plants	Wilted plants	Total
3"-6"	27.65	35.14	62.79
9"-12"	29.21	30.30	59.51
Total	56.86	65.44	122.3

Healthy < Wilted P < 0.05, Sig diff 7.21

A number of new selections from Malwa will be tested in replicated progeny rows this season and desirable progenies will be carried on and tested against the existing strains.

Selection work on Malwa Upland cotton has been transferred to Badnawar (Dhar State) in the best Upland cotton growing district in Malwa.

At Dhar progeny row selection has been initiated in a mass selected Malvi cotton maintained by the Agricultural Department and in the Nimar tract of Dhar State selection in the local Nimari bulk has given an immediate improvement of considerable magnitude.

Thanks to the co-operation of the Agricultural Department Dhar State it has been possible to carry out the breeding work in all three of these centres by the replicated progeny row technique developed at the Institute.

With thanks to the Director of the Central Institute of Cotton Research, Nagpur, H.H.

(f) *Variety Trials*—A large number of variety trials were carried out in the period under review. The potentialities of existing selected varieties for the different tracts of Central India and Rajputana are now fairly well known and may be summarised as follows:

(1) Black soil tracts of Central India (Malwa plateau)

(a) Malvi 1 and Malvi 9 yield about 20 per cent more than the local mixture. Malvi 9 gins 32-34 per cent as against about 28 per cent in local. Malvi 9 spins about 40 per cent higher counts than local.

(b) Combodia—

(2) *Nimar tract*—Banilla will give the cultivator an immediate increase in return on account of its higher ginning percentage. Verum is lower yielding than the local mixture but would pay if pooling and marketing facilities were provided.

(3) Gang Canal Colony well and tank irrigated sandy lands in Rajputana

Cawnpore 620 is a definite improvement on Mollisoni in the Gang Canal Colony and will probably pay better than local on most irrigated sandy lands. Rosea Bhatia has given very high yields in Rajputana but is very poor in quality. It is rather doubtful whether American types have any permanent place in Rajputana.

(4) *Bundelkhand*—The extension of cotton in this tract would be of very doubtful value. Yields in all trials carried out for the Institute have been extremely low owing to heavy boll shedding after untimely rains and Punk bollworm attack. No recommendation can be made.

9. *Cotton—Physiology Pathology and Agronomy*—A very large amount of data of varied character has been accumulated and is being reviewed. The following summary deals with only a small fraction of it.

(a) Bio-chemical studies on Wilt—Indications from the previous year's work regarding root relationships were confirmed thus—

(i) In the course of root studies healthy and wilted plants were removed from the soil together with the whole of their root systems. Microscopic examination of this material is being made to trace the course of infection. This work is not finished but it has been amply confirmed that the presence of fungus in a plant does not necessarily lead to its death, or even to any wilting. On the other hand wilting followed by death occurred when no fungus could be found.

Further examination of the root systems of pairs of healthy and wilted plants again showed less root activity in diseased plants than in healthy ones. A more detailed examination is being made some of the results of which are tabulated.

TABLE 1.—Root activity of healthy and wilted cotton plants in relation to soil zones
1933-34

Average lengths in inches of active roots of Malvi Cotton

(Based on root exposures of 21 plants)

Soil zones.	Healthy	Wilted	P
0°-9°	37.1	15.3	< 0.01
9°-18°	17.4	6.3	< 0.05 > 0.02
18°-downwards	16.6	8.9	> 0.05

Note.—In this and subsequent tables when P is shown as less than 0.05 the odds in favour of the validity of the result shown are 20 to 1. If less than 0.01 the odds are 100 to 1. When P is greater than 0.05 the odds are less than 20 to 1.

It seems that this weakening of root activity is located in the upper soil zones and it is from them that the plant's nutrition is chiefly derived. It appears that this is a concomitant of wilt.

(ii) Last year's observations on the periodicity of virulence were further extended and amplified. Periodicity in virulence is now established. This data is being examined in greater detail.

(iii) Soil moisture relations and wilt.—Total and hygroscopic moistures were determined at intervals in the field in two zones around the roots of healthy and wilted plants. Results are given in Table 2—A, B, C.

TABLE 2.—Means percentage moistures in soils around the roots of healthy and wilted cotton plants

A TOTAL MOISTURES

Depth of soil	Healthy plants	Wilted plants	Total
3°-6°	27.65	35.14	62.79
9°-12°	29.21	30.30	59.51
Total	56.86	65.44	122.3

Healthy < Wilted $P < 0.05$ Sig diff 7.21

B HYGROSCOPIC MOISTURE.

Depth of soil	Healthy plants	Wilting plants	Total.
3"-6"	9.7	12.9	22.6
9"-12"	11.6	10.8	22.4
Total ..	21.3	23.7	45.0

Interaction of depth with healthy and wilting plants—

Moisture values $P < 0.05$, Sig. diff. 2.72.

C. RATIOS OF MEAN PERCENTAGE MOISTURES FOR TWO DEPTHS AROUND THE ROOTS OF HEALTHY AND WILTING COTTON PLANTS

Ratio	Healthy plants	Wilting plants	P.	Significant difference.
9"-12"	1.05	0.90	<0.05	0.14
3"-6"				

The hygroscopic moistures of the upper soil zones were higher around wilting plants than healthy ones (B).

Leaf samples from healthy and wilting plants were collected and are awaiting analysis, to locate the changes in the metabolism of the plants brought about by reduced root activity.

(iv) Nutrition and cotton tests—Another line of investigation started in 1933 was as follows—

Soils both in pots (1933 and 1934) and in the field (1934) were treated with—

- (i) inorganic nutrients in different proportions,
- (ii) manures of widely different compositions and properties and
- (iii) dressings of substances calculated to effect a physical improvement of the soil

The cotton period of the same months in 1933

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experiments were given

Different degrees of virulence were observed in different treatments in fields and pot cultures. Some of the results are given below.

TABLE 3.—Effect of nutrients on incidence of Wilt

Treatments	1933-34	1934-35	Increase in death % in 1934-35 over 1933-34	
1 N (NH ₄ & NO ₃) Ratio ammonical N to nitrate N 1 : 1	50.0	100.0	+	50.0
2 N + P ₂ O ₅	50.0	91.7	+	41.7
3 K ₂ O + P ₂ O ₅ (1 : 1)	25.0	89.0	+	55.0
4 CaO	16.7	65.2	+	48.5
5 K ₂ O + P ₂ O ₅ (1 : 1)	8.3	41.6	+	33.3
6 K ₂ O + P ₂ O ₅ (1 : 1)	8.3	33.3	+	25.0
7 MgO	0.0	49.2	+	49.2
8 Compost	0.0	29.2	+	29.2
9 Glue	0.0	19.2	+	19.2
10 Farm Yard manure	0.0	42.8	—	7.2
11 Control	50.0	12.2	—	7.2
P	10.4	—	—	—
Sig diff	<.05	<.05	—	—
	27.2	30.8		

Salts used were ammonium nitrate for N, Potassium sulphate for K₂O, Calcium phosphate for P₂O₅.

In the series with added nutrients the same relative differences were observed successively for two years. Some treatments have increased and others have decreased the virulence. In 1933 the highest virulence was induced by nitrogen alone and with phosphate it increased considerably in 1934. Potash with phosphate (1 : 1) in 1933 did not increase virulence significantly but in 1934 this treatment reached the level in this respect, of the nitrogen alone and with phosphate.

When the ratio of potash and phosphate was altered in either direction the increase of virulence in 1934 did not reach significance though reduction in potash nearly did so.

Magnesia and lime did not differ from control in 1933 but gave a significant rise in virulence in 1934 of the same order as potash and phosphate (1 : 1).

Compost and glue in both years showed no significant difference from farm yard manure and control though the first pair showed a numerical rise in virulence in 1934 and the second pair a fall.

An excessive supply of nitrogen seems to be very powerful in increasing susceptibility. A study of the cumulative effect of several treatments is perhaps likely to give further information as to the nature of the balance between soil components which determines resistance or susceptibility.

(v) The yield of cotton as influenced by wilt incidence.—In order to discover whether

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the yield is influenced by the differences between yields is yet to be determined by picking

TABLE NO. 4—*Influence of "Wilt" on cotton yield*

KAPAS GMS PER PLANT

Healthy plants	Mean yield	Comparison	N	T	P
A From unaffected patches	17.05	A Vs. B	47	1.7	> 0.0
B From affected patches	12.0	A Vs. C	45	4.89	< 0.1
C Wilted plants		A Vs. D	40	4.48	< 0.1
D Dead	4.3	B Vs. C	54	4.7	< 0.1
D Resumed fresh growth	4.2	B Vs. D	49	4.3	< 0.1
		C Vs. D	47	0.09	> 0.0

(b) Cotton nutrition in relation to environment

(Yield)

(i) Soil type The influence of sowing date on yield was reported last year, that of soil type was then investigated in lysimeters filled with field soil, zone by zone as it exists in nature. The soils used were

- (1) Jaipur sandy soil
- (2) Soil of the Badnawar tank areas in Dhar State (noted for good Cambodia cotton)
- (3) Black soil well drained but shallow (about 2 to 3 feet) from Institute Field 31
- (4) Light grey-coloured deep soil (about 15 feet) well-drained from Institute Field 40

In 1933 Cambodian (Indore 1) and Malvi (No. 9) cotton were sown no manure was given and after the monsoon rain water was applied as required hence the intrinsic differences in productivity and varietal suitability of the soils were the only operating factors. The relative exhaustion of these soils by the cotton crop was measured by growing a second crop of the same varieties in 1933. Again no manure was given nor any water after the cessation of rains which were exceptionally copious.

In this and the next three experiments which were in the nature of feeders the data given in Tables 5 to 9 are not capable of statistical examination.

TABLE 5—Calculated yield of seed cotton in gms per 100 sq. ft. in Lysimeters—1933 and 1934

Variety	Soil 1	Soil 2	Soil 3	Soil 4				
Indore 1	1933 259	1934 15	1933 1332	1934 113	1933 110	1934 0	1933 237	1934 7
Malvi 9	449	218	1194	230	212	169	431	232

In 1933 soil 4 yielded more than 100 per cent. In general there was a marked seasonal variation.

Soil 2 (Badnawar)

The Cambodi

Badnawar

Used at Badnawar seen

With heavy manuring given—

custom inherited from the opium crop practice by its present successor. The deterioration of this soil through one crop of cotton is more serious than that of ordinary black cotton soils and it is questionable how far the current practice is sound.

(ii) *Harrus rufipennis* — It was reported in 1931 that yields of Maize increased when manure was applied to the whole profile, in strong contrast with the insignificant yield differences from field crops surface dressed.

Cotton—Cambodia (Indore 1) and Malti (No. 9) was grown in the same manured profile plots in 1934 to ascertain the continuity of the effect of profile application with the following results—

TABLE 6.—Calculated yields of seed cotton in gms. per 100 sq. ft. in manured plots at Fort Davis in 1933 and 1934.

Treatment	Malwa D		Indore I
	1933	1934	1931
No treatment	1170	656	168
Farm Compost	2107	1306	749
Farm Yard Manure	1880	910	615
Municipal Compost	2370	1102	617

In 1933 measures were mixed throughout the profile down to murum—18 24 inches in depth. In 1936 they were given as surface dressings at 16 tons per acre.

Because of a difference in plant spacings the yields for the two years should not be compared together but the order of productive capacity of treatment may be contrasted

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is noteworthy that farm
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tton soils both manured

(iii) *Soil texture*—The influence of open surface texture reported last year was tested for residual effect a cotton crop being sown again on the same plots with the following results—

TABLE 7.—Soil texture and cotton yield—1933 and 1934 Calculated yields of seed cotton in gms per 100 sq ft

Variety	Control	Unmanured		Manured			
		Heated soil		Control	Heated soil		
		6" surface layer	50% in 6" surface layer		6" surface layer	50% in 6" surface layer	
Year 1933 Indore 1 Malvi 9	221 658	456 1164	608 601	277 910	762 1399	975 1174	
Year 1934 Indore 1 Malvi 9	163 215	26 375	123 317	143 232	115 222	78 144	

In 1933, in unmanured plots, the 50 per cent heated soil treatment gave the highest yield with Cambodia, and the full 6 inches layer treatment with Malvi. The response to manures for Cambodia was considerably higher in the plots treated with heated soil than in the control. Malvi responded to manure better than Cambodia on untreated plots.

yields in the same way and to a greater extent than does manuring. With Cambodia, however, open texture was an essential factor for any increase in yield with or without manures.

All yields fell in 1934, but the fall was least with Cambodia in the untreated plot without manure. The contrast with the 6 inches depth of soil for Cambod-

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however the same for both varieties showing clearly the superiority of humus in raising yields. It is also evident that about six inches depth of soil of open texture brings a higher response to manures.

(iv) *Nutrients*.—In spite of negative results from field trials in 1931 and 1932, the results set out above clearly indicated the possibility of a favourable response to manures under certain soil conditions. A qualitative test was made in 1933 in pot-cultures to find what nutrients were most likely to induce response. The 92 pots were filled with uniformly graded surface soil treated in bulk with their respective nutrients. The experiment was done in duplicate with Cambodia (Indore 1) and Malvi 9 cotton.

In 1934 another experiment was made with four replications using 102 pots, to test the effect of the more promising nutrients upon soils treated to bring about differences of texture by flocculation.

The results are shown in Table 8, A to F.

TABLE 8.—Differences in response of Cambodia, Indore 1 and Malvi 9 to nutrients

A—MAXIMUM RESPONSE—1933 EXPT

Influence on	Indore 1			Malvi 9		
	Treatment	Control	Wts. or hrs. max.	Treatment	Control	Wts or hrs max
Yield of fibres	sm. sulph. 1/2 dose	1.2	21.2	sm. sulph. + di sod. hyd. phosph.	2.6	19.3
Plant weight after 42 days	sm. sulph. + di sod. hyd. phosph. + pot. sulph. 1 dose	2.7	13.0	sm. sulph. + di sod. hyd. phosph. + pot. sulph. 1 dose	1.8	7.2
Final height after 123 days	sm. sulph. 1/2 dose	9.75	12.5	sm. sulph. + di sod. hyd. phosph. 1 dose	11.0	44.25

B—DEPRESSING INFLUENCES OF TREATMENTS

Depression in	Treatments.	
	Indore 1	Malvi 9
Yield of kafas	Nil	am sulph 1 dose
Plant weight at 43 days	am sulph + pot sulph 2 doses 1 lot sulph 1 dose and 2 doses sod nitrate 2 doses	Sod nitrate 1 dose pot sulph 2 doses di sod hyd phosph
Final height	Di sod hyd phosph 1 dose and 2 doses pot sulph 2 doses	1 dose am sulph 2 doses Pot sulph 1 dose

C—MODIFYING INFLUENCE OF COMPONENTS OTHER THAN THE NUTRIENT ELEMENTS

—	Yield		Plant weight		Final height	
	Indore 1	Malvi 9	Indore 1	Malvi 9	Indore 1	Malvi 9
<i>Nitrogen alone</i>						
am sulph 1 dose	9.1	1.7	6.9	1.4	13.75	23.0
sod nitrate 1 dose	8.3	4.6	6.7	1.6	14.5	21.5
calc nitrate 1 dose	8.7	11.85	3.9	2.4	14.5	34.0
<i>Phosphates alone</i>						
di sod hyd phosph 1 dose	5.3	5.45	3.8	1.2	8.5	13.5
super phosph 1 dose	7.8	8.9	2.9	2.1	13.5	18.0
am sulph + di sod hyd phosph 1 dose	7.2	19.3	7.9	5.4	11.5	44.25
<i>Nitrogen plus phosphate</i>						
am sulph + di sod hyd phosph 1 dose	7.2	19.3	7.9	5.4	11.5	44.25
Nicos 17/45	12.5	16.25	3.3	3.4	15.25	29.0
Nicos 22/18	11.9	11.20	10.1	2.2	12.5	18.0

D—INFLUENCE OF ONE NUTRIENT ELEMENT ON ANOTHER

—	Yield		Plant weight		Final height	
	Indore 1	Malvi 9	Indore 1	Malvi 9	Indore 1	Malvi 9
<i>am sulph + di sod hyd phosph 1 dose</i>						
am sulph + pot sulph 1 dose	7.2	19.3	7.0	5.4	11.5	44.25
am sulph + pot sulph + di sod hyd phosph 1 dose	4.90	4.0	6.6	3.1	13.0	18.5
am sulph + pot sulph + di sod hyd phosph 1 dose	14.1	3.9	13.0	7.2	14.5	30.0

E—COMPLETE NUTRIENT IN DIFFERENT FORMS AND WITH DIFFERENT RATIOS N K
P₂O₅

	Ratio N K ₂ O P ₂ O ₅	Yield		Plant weight		Final height.	
		In dore I	Malvi 9	In dore I	Malvi 9	In dore I	Malvi 9
Safflower cake	1.033 0.66	17.9		6.4	3.5	14.0	
Municipal compost	1.14 1.7	11.9	14.6	5.4	3.5	11.9	22.25
Farm compost	1.34 0.58	6.5	6.10	6.4	2.1	10.0	18.0
Farm yard manure	1.39 1.7	5.5	7.3	4.2	2.0	14.5	16.0

F—MODE OF APPLICATION ONE AND TWO DOSES

		Yield		Plant weight		Final height.	
		Indore I	Malvi 9	Indore I	Malvi 9	Indore I	Malvi 9
am sulph	1 dose	9.1	1.7	6.0	1.4	13.75	23.0
	2 doses	21.2	14.4	3.0	1.7	19.5	25.0
sod nitrate	1 dose	8.3	4.5	5.7	1.6	14.5	21.5
	2 doses	11.4	7.2	2.1	2.6	13.0	16.75
di sod hyd phosph	1 dose	5.3	6.45	3.8	1.2	8.5	13.5
	2 doses	4.20	3.0	2.8	3.8	0.0	11.5
am sulph + di sod hyd phosph	1 dose	7.2	10.3	7.0	5.4	11.5	44.25
	2 doses	7.7	7.7	10.3	2.2	15.5	25.5
pot sulph	1 dose	4.97	4.40	2.1	2.6	14.0	10.5
	2 doses	6.9	5.5	8.25	1.2	8.25	13.0
am sulph + pot sulph + di sod hyd phosph	1 dose	14.1	3.9	13.0	7.2	14.5	30.0
	2 doses	6.6	13.75	6.5	6.0	15.25	31.75
am sulph + pot sulph	1 dose	4.00	4.0	6.6	3.1	13.0	18.5
	2 doses	3.15	6.10	3.1	3.9	12.5	16.0

The following points were brought out by these pot-cultures —

(1) The greatest plant weights for both varieties within a period of 43 days from germination were produced by complete nutrients given in one dose

(2) Maximum *Aetas* yields of Cambodia however were given with ammonium sulphate in two doses and of Malvi 9 with a mixture of ammonium sulphate and di sodium hydrogen phosphate in one dose

(3) Maximum heights were given by those treatments which gave maximum yields

(4) The yield of Cambodia was increased by all treatments. Ammonium sulphate in one dose however depressed it for Malvi 9

(5) Plant weights at 43 days and final heights were lower than control with some treatments.

(6) Nutrients applied in different amounts or in different ways to the soil do not always respond in the same way. The results of all treatments were different from treatments differing in the proportionality of nutrient ratios. In the experiments reported here the same result was obtained by different treatments.

Absolute values (plant weight in the early stages or the final growth) do not show any consistent relation to the treatment¹. The amount of growth is influenced by the presence or absence of one or more nutrients, but not by their ratio. The combination of nitrogen and phosphorus had a larger influence than potassium on seed cotton production. Different ratios between nutrients may give the same amount of growth effects but such different effects can also be produced by nutrients in the same ratios but in different forms.

For both the varieties the application of nitrogen and in some degree potash in two doses is better than in one dose but two and a half times the plant weight gave the greatest effect. Combinations of nitrogen and potash and nitrogen plus lime gave a good growth rate, better results with Cambodge when ammonium sulphate was used with Na₂SO₄. It was the presence of nitrogen and phosphorus that increased the cotton production. In fact there is no difference between one and two doses.

An effective system of managing will have to be based upon the correct intensity of nutrient supply especially of nitrogen and to a lesser extent phosphorus in the early and later stages of growth.

The effect of the unabsorbed fractions of the elements absorbed (ashes, acidity etc.) is known to be indirect through their modifying influence on the physical characteristics of soil, hence it seemed necessary to determine the soil texture suitable for the absorption of the nutrients.

The results of the 1934 experiment which was intended to give further information in this direction are tabulated below.

TABLE 9.—Texture differences and nutrient efficiencies for season 1934-35.
Yield of seed cotton and plant weights are given in pds. per plant and heights in inches.

A—INDORE I

Treatment	No Treatment			Compost			Ash			Compost + Ash		
	Yield Kgnes	Final Plant weight	Final Plant height									
N	3.6	8.0	7.6	4.9	14.8	14.0	2.8	5.5	3.5	8.7	25.1	11.7
P	4.8	7.0	7.6	11.0	40.8	22.1	4.6	15.0	10.0	8.6	27.1	10.6
K	10.7	68.0	12.3	6.8	23.0	16.3	2.8	7.0	6.1	4.9	8.6	10.4
NP	7.1	15.0	16.8	19.2	25.2	20.2	6.2	8.0	9.0	6.4	10.8	13.2
NK	15.6	41.0	29.2	15.7	93.0	29.4	7.0	12.1	14.1	7.6	35.7	14.2
	6.6	19.0	20.4	22.7	66.0	28.7	0.0	4.1	14.2	11.7	23.6	20.4

B—MALVI D

	2.6	5.2	13.0	6.3	18.1	12.4	1.3	1.7	16.1	6.0	26.2	33.5
N	2.2	24.6	21.0	13.0	25.1	66.7	4.0	10.0	20.7	12.1	32.3	26.7
P	2.7	15.7	21.2	6.2	25.2	26.8	1.3	4.0	12.8	3.6	6.7	21.6
R	2.8	15.0	15.0	9.0	25.3	31.2	5.4	20.1	10.9	8.6	21.6	31.1
NP	15.2	77.6	52.2	32.7	62.7	59.8	7.2	18.3	20.9	6.7	19.2	35.4
NK	2.8	23.6	25.6	13.4	61.0	50.7	3.2	7.0	17.0	6.6	61.2	49.4

E.—COMPLETE NUTRIENT IN DIFFERENT FORMS AND WITH DIFFERENT RATIOS NK
P₂O₅

	Ratio	Yield		Plant weight		Final height	
		N K ₂ O P ₂ O ₅	In dore 1 Malvi 9	In dore 1 Malvi 9	In dore 1 Malvi 9	In dore 1 Malvi 9	In dore 1 Malvi 9
Safflower cake	1 0 33 0 68	17 0		6 4	3 5	14 0	
Municipal compost	1 1 4 1 7	11 0	14 6	5 4	3 5	11 0	
Farm compost	1 3 4 0 58	6 5	6 10	6 4	2 1	10 0	18 0
Farm yard manure	1 3 9 1 7	5 6	7 3	4 2	2 9	14 5	16 0

F.—MODE OF APPLICATION ONE AND TWO DOSES

		Yield		Plant weight		Final height	
		Indore 1	Malvi 9	Indore 1	Malvi 9	Indore 1	Malvi 9
am sulph	1 dose	9 1	1 7	5 0	1 4	13 75	23 0
	2 doses	21 2	14 4	3 6	1 7	19 5	25 0
sod nitrate	1 dose	8 3	4 6	5 7	1 8	14 5	21 5
	2 doses	11 4	7 2	2 1	2 6	13 0	15 75
di sod hyd phosph	1 dose	5 3	0 45	3 8	1 2	8 5	13 5
	2 doses	4 20	3 0	2 8	3 8	9 0	11 5
am sulph + di sod hyd phosph	1 dose	7 2	19 3	7 0	5 4	11 5	44 25
	2 doses	7 7	7 7	10 3	2 2	15 5	25 5
pot sulph	1 dose	4 07	4 40	2 1	2 6	14 0	10 5
	2 doses	6 0	5 5	8 25	1 2	8 25	13 0
am sulph + pot sulph + di sod hyd phosph	1 dose	14 1	3 9	13 0	7 2	14 5	30 0
	2 doses	6 6	13 75	6 5	6 0	15 25	31 75
am sulph + pot sulph.	1 dose	4 80	4 0	6 6	3 1	13 0	18 5
	2 doses	3 15	6 19	- 1	3 0	12 5	16 0

The following points were brought out by these pot-cultures —

- (1) The greatest plant weights for both varieties within a period of 43 days from germination were produced by complete nutrients given in one dose
- (2) Maximum *karpas* yields of Cambodia however were given with ammonium sulphate in two doses and of Malvi 9 with a mixture of ammonium sulphate and di sodium hydrogen phosphate in one dose
- (3) Maximum heights were given by those treatments which gave maximum yields
- (4) The yield of Cambodia was increased by all treatments. Ammonium sulphate in one dose however depressed it for Malvi 9

MALVI (No. 9) COTTON

(i) Nitrogen has no influence on yield and flocculation by acid or the addition of potash makes little difference but in combination with phosphate the yields almost become five-fold and reach the maximum for the variety. Compost gives nearly twice as much yield as nitrogen but a combination of compost with nitrogen raises the yield to four times that from nitrogen alone.

(ii) Like nitrogen, potash and phosphate alone had no influence on yield.

(iii) Flocculation by acids has no influence except in the presence of nitrogen and phosphate together or potash alone. Compost however reduces the response to nitrogen plus phosphate by 20 per cent. and with acid flocculation the yield is further reduced by 25 per cent. to the level of yields from acid alone. In combination with nitrogen acid flocculation raises the yield one and a half times but further addition of compost to the combination gives further increase to three times.

This probably indicates that any favourable influence of compost on Malvi 9 is through its power to supply nutrient and not so much to its effect upon moisture relation.

It appears that the conditions produced by compost in presence of all added nutrients are favourable for Cambodia but definitely unfavourable for Malvi, when the added nutrient is a combination of nitrogen and phosphate.

If the drying effect of compost alone on the soil is assumed to be less powerful on the soil than that of acid flocculation, it may be concluded that compost keeps the moisture at adequate levels except when, as with Malvi 9 treated with nitrogen and phosphate, the demand becomes too high.

TABLE 10.—Influence of green manure on the yields of wheat and cotton at Indore

Variety—Malvi 1

Yield in lbs. per acre

Yield of	Green manures cut and removed					Green manures ploughed in					Significant difference
	Black gram.	Sann.	Soya beans	Cow peas	Black gram.	Sann.	Soya beans	Cow pea	Fallow	P	
Total yield—											
Wheat, 1932	635	677	472	597	604	658	634	479	475	< 0.05	104
Cotton, 1933	540	522	517	517	585	523	565	486	442	> 0.05	—
Yield of two packings of cotton (1st & 2nd)	281	267	243	263	291	254	251	235	172	< 0.05	51

V—HUMUS SUPPLY (FIELD SCALE)

Some of the investigations described in paras (i) to (iv) above have also been studied under field conditions—the results are summarised below under the same headings. Green manuring followed by wheat in the same year and subsequently by cotton gave higher total yields with wheat but not significantly with cotton though the first two packings yielded better with green manure. The rainfall was very heavy (51.82 inches) and it is possible that in normal years increases may also be obtained with total yields (Table 10).

VI.—SOIL TEXTURE

Both Malvi 9 and Cambodia Indore 1 did not respond significantly to field applications of heated soil at five or twenty cartloads per acre. The doses were much smaller than those used for the small plots mentioned above. A test is being made to find the effect of heavier applications within the range of practicability.

Similarly in another field test flocculation by sulphuric acid gave no yield differences even when repeated twice during the crop period. Superphosphate behaved similarly.

The steady maintenance of favourable moisture conditions resulting from open texture cannot be brought about in Indore soils by mechanical means to ensure good drainage conditions. An experiment repeated for three years consistently gave no significant differences in yields when attempts were made to keep open texture by providing shallow furrows at different intervals between rows of the growing crop to regulate drainage and soil aeration.

In the last three years very heavy rains spoiled several field experiments aimed at estimating the influence on the yields of cotton and other crops of—

- (1) Previous crop
- (2) Interculture to keep mulches of different depths
- (3) Weeding
- (4) Intersowing of other crops

The last year's experiment shows a significant detrimental influence due to absence of weeding even when the rains have depressed the yields of the cotton crop to the lowest limit.

TABLE II.—Response of common crops to interculture and weeding 1932-34

Yields in lbs. per acre

A CROP—COTTON

Year	Hand weeding only	Indore ridger and weeding	Daura & weeding	Guntaka & weeding	P	Significant difference
1932	265	270	225	248	> 0.05	—
1934	229	282	312	254	> 0.05	—

B CROP—JOWAR (*Sorghum*)

1932 Grain Kadbi *	149 4 340	148 4 300	251 4 280	216 3 900	< 0.05 < 0.05	48 497
1934 Grain Kadbi	373 1 897	352 2 068	409 2 166	368 1 971	> 0.05 > 0.05	— —

* Dry stems and leaves.

C CROP—TUR (Cajanus indicus—finger pea)

Year	Hand weeding only	Indore nederland weeding	Daura and weeding	Guntaka and weeding	P	Significant difference
1933 Grain Bhusa*	653 520	615 463	660 533	670 560	>0.05 >0.05	—

* Straw and chaff

D CROP—COWPEAS

1933 Grain	135	116	146	130	>0.05	—
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E CROP—WHEAT

1933 Grain Bhusa	330 492	343 655	251 464	228 451	>0.05 >0.05	—
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F—INFLUENCE OF INTERCULTURE AND WEEDING ON COTTON (1933) VARIETY—MALVI
BULK—LB PER ACRE

Ridger and weeding	Ridger no weeding	Daura and weeding	Daura no weeding	Weeding alone	No weeding	P	Sig diff
105.2	10.4	86.4	2.1	60.1	3.1	<0.05	50.4

Shallow interculture either by Daura or Guntaka benefitted the jowar crop in 1933. This seems to be due more to the effective weeding done by these implements than to their capacity to produce a mulch. This has been confirmed by the results of another experiment in 1933.

TABLE 12.—Yield and growth of jowar as influenced by weeding and interculture

Yields in lb per acre

1933

VARIETY—JOWAR MALVI

	Ridger		Daura		No interculture			
	Weeding	No weeding	Weeding	No weeding	Weeding	No weeding	P	Sig diff
Grain Kadbi	181 1934	161 1559	137 2259	100 2125	198 2334	69 1950	<0.05 <0.05	43.7 407.8

The influence of cultivation during the cold weather on the crops of the following season has been studied since 1932. The types of cultivation compared were —

- (1) Opening the soil surface to about three inches *desi* plough
- (2) Subsoiling
- (3) Soil inversion—Ransome's CT 2 plough and
- (4) Subsoiling followed by opening the soil surface with the *desi* plough

The experiment has not yet run sufficiently long to show cumulative effects. Heavy rains in the last two years have depressed the cotton crop.

TABLE 13.—Yield response of common crops to winter cultivation

Yield—in lb per acre

A CROP—COTTON

Year	No cold weather cultivation	Country plough	Sub soiler	Inversion plough	Sub soiler & country plough	P	Sig diff
1932	160	108	138	140	148	>0.05	—
1934	51	47	72	49	40	>0.05	—

B CROP—JOWAR

1932 Chari*	17 430	17 310	16 310	17 110	19 450	>0.05	—
1934 Grain	319	204	335	218	263	>0.05	—

* The whole crop cul green

C CROP—GROUNDNUT

1933 Bhusha	418 700	334 655	423 722	330 663	351 603	>0.05 >0.05	—
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D CROP—COWPEAS

1933 Grain	95	70	100	80	83	>0.05	—
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E. Crop—WHEAT

Year	No cold weather cultivation.	Country plough	Sub-soiler	Inversion plough	Sub-soiler and country plough	P	Sig diff
1933							
Grain Bhusa	646 1,549	531 1,573	612 1,614	9.6 1.6.6	22 1,503	>0.05 >0.05	=

So far as the results go however there seems to be no immediate effect of any type of inter-cultivation on the succeeding crop

VII NUTRIENTS (field scale)

At Indore a complex experiment with six factors was carried out on Malvi 9 cotton in a rich field. The general cotton yields of 1931 were very low and the results obtained are naturally indicative of what may be expected in similar seasons. The following comparisons with their interactions were included —

- (1) different depths of interculture (Jaura or Indore ridges)
- (2) row spacings (14 and 21 inches)
- (3) artificial manure
- (4) organic and inorganic manure (Safflower cake and Niclos 22/18)
- (5) Units of nitrogen ($7\frac{1}{2}$ and 10 lb per acre) and
- (6) method of application (broadcast and drilled)

TABLE 14.—Response of Malvi 9 to manures—1934

Yield—lb per acre

With manures	Without manures	P	Sig diff
448	363	<0.05	40.1

Significant differences in yields were obtained only by manuring. Unless it is found otherwise in a particular case a great latitude seems to be available for choosing manure (the differences between which were 10 lb per acre could perhaps be reduced to 5 lb per acre). The labour of application

At Dhar, however, yields of Malvi cotton were depressed by safflower cake while the higher yields obtained from Nicos (22/18) though high enough to be significant to take were not quite significantly different from control. This experiment was located on shallow eroded soil on the lower slope of a hill and hence liable to severe run off. Under such condition the utility of manure is not likely to be great.

With Cambodia (bulk seed) there was an opposite result, safflower cake gave significantly higher yields than both control and Nicos (22/18).

TABLE 15—*Yield differences due to manures*

DHAR 1934

lb kapas per acre

Variety	Treatments			P	Sig diff
	Control	Nicos 22/18	Safflower cake		
Malvi bulk	630	692	541	<0.05	59.9
Cambodia bulk	403	391	474	<0.05	43.8

A similar experiment at Jaipur with Cambodia Indore 1 in addition to confirming the superiority of earlier sowings recorded in 1934 showed yield depression with Nicos (22/18) while as at Dhar the higher yields of the cake treatment did not reach significance.

TABLE 16—*Sowing dates and yield of cotton*

JAIPUR 1934

Variety Cambodia Indore 1	April	May	Rains	P	Sig diff
Yield in lb kapas per acre	682	681	200	<0.05	189

TABLE 17—*Manure and yield of cotton*

JAIPUR 1934

Variety Cambodia Indore 1	Control	Castor cake	Nicos 17/45	P	Sig diff
Yield in lb kapas per acre	651	831	497	<0.05	266

The high yield at Dhar is mainly due to a low seed rate per sown plot.

It will be seen that the response of Cambodia cotton to fertilizer is almost identical to that observed in pot cultures, i.e., compound + 15% yield increase in the two Cambodias and in Malwa cotton responds best to a single dose of nitrogen, as well as with castor cake. It is due to nutrients deposited upon the soil texture and its water holding capacities.

In nutrient contents of the soils already reported in a paper¹, it has been shown that alication of 11% more manure was required in Malwa soil than in Jaipur soil. The better response of Cambodia cotton to cake at Dhar than at Jaipur confirms this in the field.

It is quite clear from the foregoing field results that for the present concentration it is best to be profitable only on the modifications in cotton nutrition and manuring.

Rotation for cotton—The experiment was started in 1932 and subsequently recast in 1933. It comprises five alternative rotations of cotton with jowar, tur, groundnut, cowpeas and wheat. Started at two years, the full cycle will be complete in 1936 and will then be reported. The separate experiment—the influence on cotton of seven different preceding crops—has been completed but results are not yet examined. The cotton plots of 1933 yielded very low.

(c) *Cotton nutrition in relation to environment—Quality*—The data from pot cultures of 1933 are not yet statistically examined; they deal with the influence of soil texture, humus supply and nutrients upon the plant length and ginning percentage of Cambodia and Malwa cottons.

Similar data, however, from field experiments at Dhar and Jaipur are discussed below.

Cambodia—The influence of environment on staple length was determined on the seed cotton obtained from each treatment in the Jaipur experiment with the following results (Table 18) A to D.

TABLE 18
Influence of environment on staple length—Jaipur 1934

Variety—Cambodia Indore 1

A

Mean staple length in mm

Sowing dates	Manure		No manure	
	Castor cake		Lucifer 17/45	
	Plant spacings		Plant spacing	
	12 in	18 in	12 in	18 in
April	25.6	21.8	24.8	21.2
May	24.8	24.8	24.6	23.0
On rains	23.6	22.7	26.3	24.7
				22.3
				23.5
				24.9
				22.0
				23.0
				23.5

¹ Nitrogen balance in Black soil—III. Wed 3. 13 and A. Ganguly, K. R. K. Report Proc Ind. Sci. Cong. 1934 (in publication).

Rates of manures applied: 21 lb of N per acre, i.e., 6 cwt of castor cake (N=3%) or 150 lb of Nicifos 17/45 per acre

Significances

Treatment	P.	Sig. diff. for the mean
Sowing dates .	<0.01	
Manure v. no manure	<0.05	
Spacings . . .	<0.05	
B — Sowing dates \times (manure v. no manure)	<0.01	0.35
C — Sowing dates \times (cake v. Nicifos 17/45)	<0.01	1.50
D — (Manure v. no manure) \times Spacing .	<0.05	1.20

B

Mean staple length in mm

Sowing dates \times (manured v. unmanured).

Manured			Unmanured		
April	May	Rains	April	May	Rains
24.1	24.3	24.3	22.5	23.2	25.2

C

Sowing dates \times quality of manure

Castor cake			Nicifos 17/45		
April	May	Rains	April	May	Rains
23.7	24.8	23.2	24.5	23.8	25.5

D

(Manured v. unmanured) \times plant spacings

Manured		Unmanured	
Plant spacings		Plant spacings	
12 inches	18 inches	12 inches	18 inches
24.0	23.5	23.6	23.7

The use of manure has the main effect of stretching and lifting level at almost all sowing dates closer spacing nearly always giving a longer staple. Without manure staple length diminished with each earlier sowing equally for both spacings. Rain grown crops with Nicofos or no manure gave higher levels. The kind of manure had different effects at different sowing dates.

Castor cake gave a longer staple on the May rain crop than that sown on runs but Nicofos raised the staple length of rain grown cotton to the highest level in the trial.

Considering the following points —

- (1) the rates of nitrification of inorganic and organic manures,
- (2) the differences in moisture in hot weather and monsoon,
- (3) the higher rate of nitrification in hot weather, and
- (4) the differences in evaporation of soil moisture due to spacing during the boll-developing stage i.e. after the runs cease, it appears that an ample supply of nitrogen with sufficient moisture in the early stages has a favourable influence on staple length.

The results obtained on staple length of the Cambodia crop in the Dhar experiment are given below.

TABLE 10

Influence of environment on staple length—Dhar 1034

Variety—Cambodia

Staple length in mm

Plant spacing	Single unit of manure *	Double unit of manure †	No manure	Mean for spacing
12 inches	19.1	20.9	—	19.8
18	18.8	18.6	18.7	18.7

Significance

Plant spacings— $P < 0.05$ sig diff = 1.0 mm

Plant spacings \times (Cake v. Nicofos 22/18)

Experimental Z = 0.7187 Z required = 0.7203 for $P = 0.05$

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This also confirms the suggestion of the favourable effect of initial manure supply and of soil moisture during boll development.

* Single unit 7½ lb N per acre † 220 lb of castor cake ($N = 6\%$) or 12 lb Nic for 22/18 per acre

† Double unit double the above quantities

The results were much more definite in the Dhar experiment with the hardier Malvi cotton. They are tabulated below:—

TABLE 20
A Mean staple length in mm

Plant spacings	Manure				No manure	
	Safflower cake		Nicos 22/18			
	Single unit *	Double unit †	Single unit	Double unit		
12 inches	19.3	19.2	17.1	18.5	18.6	
18 "	19.2	19.3	16.2	19.0	16.2	

Significances.

Manure v. no manure	P <0.01
Quality of manure	<0.01
Units of manure	. <0.05
Quality x units of manure	. <0.03
Spacings	. <0.01
B Spacings x units of manure	. <0.01

$$\text{Sig. diff.} = 0.89$$

$$\text{C. Spacings} \times \text{quality} \times \text{units of manure} \quad <0.01$$

$$\text{Sig. diff.} = 1.2 \text{ mm}$$

B

Mean staple length in mm per plot

Plant spacings x units of manure

Plant spacing 12 inches			Plant spacing 18 inches		
No manure	Single unit	Double unit	No manure	Single unit	Double unit
18.53	18.20	18.62	16.18	17.06	19.12

* Single unit 71 lb per acre, i.e., 210 lb of safflower cake (= 2.0%) or 42 lb Nicos 22/18 per acre.
† Double unit double the above quantities.

Plant spacings > quality of fertilizer > unit of manure

Plant spacings	Sunflower cake		Nitrogen 22/18	
	Single unit	Double unit	Single unit	Double unit
12 inches	19.32	19.16	17.04	18.48
18	19.16	19.28	16.16	18.00

When closely spaced and without manure the crop gave a staple equal to some of those given by manures but the widely spaced crop (without manure) gave the lowest lint length. ~~because~~ apparently a high staple less wider spacing on the Cambex effect of Nitro this is due to in variety and environment

Development of the plant - Yield

Green photo
ometers

Three
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One set
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(November 1934)

American cotton (P. 2891),
completely equivalent

at the beginning of July. Half the
cotton with
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monitors of nutrient starvation in the
notes at monthly
observed

requirements

Total figures for all observations taken during and after the period of illumination are given in Table 21 A to C

The records of bud production, shedding total yield and vegetative growth for all the varieties are discussed below —

TOTAL BUD PRODUCTION

Malvi — Maximum bud production was obtained with illumination for both sowings in soil and with or without it for May sown and cultures with other treatments, bud production was nearly 50 per cent less

Cambodia — Illumination doubled the production for July soil plants but did not much affect the production (high or low) of the other treatments

P. A. 289F — The total number of buds was low in general and illumination seemed to be unfavourable especially for the July soil culture

It appears that a favourable effect equivalent to that of increased photo synthetic activity can be produced without it when high nitrification can be maintained (whether by summer sowing or by use of sand). Malvi fares best with illumination and P. A. 289F worst with equal nitrogen supply

Shedding — With all the varieties the changes observed were similar to those of bud production but sometimes differed in degree

TABLE 21.—*Environment and the development of the cotton plant*

A. MALVI P

Description.	Summer sown (20-3-31)				Rain sown (4-7-31)			
	Col.		Sand		Sod		Sand	
	To II Illumi- nated	Illumi- nated	To II Illumi- nated	Illumi- nated	To II Illumi- nated	Illumi- nated	To II Illumi- nated	Illumi- nated
I. Upto 20th November 1931								
1 Total bud production	78	144.2	142	162.3	80.5	165	78	85
2 Total shedding	45	103	107	106	31	77	48	56
3 Interval (days) between date of sowing and beginning of shedding	90	23	90	41	50	90	56	90
4 Period of shedding (\pm days)	90	1.2	90	1.0	90	50	90	56
5 Rate of shedding (per day) Item 3 by Item 1	0.62	0.65	1.2	0.75	0.34	1.4	0.44	1.0
6 Percentage of shedding on total bud production	71.6	71.3	70.4	65.3	38.5	45.7	60.0	65.9
7 Yield of Kepas in gms	13.6	0.3	15.3	1.1	1.8			
8 Number of mature bolls	8	0.3	1-	1.3	1.5			
9 Number of green bolls present on 21st Nov	12	2	3	4	40	6	20	1
10 Kepas per bolling gms	1.6	1.0	1.3	0.6	1.2			
II. From 20th November 1931 to 27th February 1932								
1 Yield of Kepas in gms	10.2	8.3	7.7	4.3	40.0	5.3	47.2	2.9
2 Number of mature bolls	12.7	10	7.3	9.3	40	4	22.5	2.5
3 Kepas per boll (gms)	1.3	0.53	1.05	0.40	1.15	1.32	2.09	1.16
III.								
1 Total yield of Kepas (gms)	28.8	8.6	23.0	6.4	47.8	5.3	47.2	2.9
2 Total number of mature bolls	20.7	10.3	19.3	10.6	41.5	4	22.5	2.5
3 Kepas per boll (gms)	1.4	0.8	1.2	0.5	1.15	1.3	2.1	1.2
IV. Vegetative growth								
1 Shoot length per bud in inches	2.0	1.9	2.1	1.8	3.0	2.1	2.6	2.2

TABLE 21.—*Environment and the development of the cotton plant*

B CAMBODIA INDORE 1

Description	May sown (30.5.34)				July sown (4.7.34)			
	Soil		Sand		Soil		Sand	
	Un illuminated	Illuminated	Un illuminated	Illuminated	Un illuminated	Illuminated	Un illuminated	Illuminated
I Upto 20th November 1934								
1 Total bud production	103	128.3	136.7	106	77	176	76	63
2 Total shedding	91	163	103	93	66	81	53	57
3 Interval (in days) between date of sowing and beginning of shed- ding	40	22	46	22	58	58	59	97
4 Period of shedding (in days)	142	170	112	100	90	90	99	55
5 Rate of shedding (per day) Item 2 by Item 4	0.61	0.66	0.76	0.58	0.72	0.93	0.64	0.95
6 Percentage of shedding on total bud produc- tion	86.7	81.8	73.0	86.1	86.7	66.7	76.3	90.3
7 Yield of Kepas in gms	11.6	0.7	20.9					
8 Number of mature bolls	4.7	0.3	—?					
9 Number of green bolls present on 9-11-34	6	6	8	2	11	11	5	1
10 Kepas per bolling gms	2.5	2.3	2.7					
II From 23rd November 1934 to 28 February 1935								
1 Yield of Kepas (gms)	12.2		9.4	0.6	45.0	19.3	21.5	5.9
2 Number of mature bolls	5.7		5.5	0.3	18	8	10	4.5
3 Kepas per boll (gms)	2.1		1.6	2.0	2.5	2.4	2.15	1.3
III								
1 Total yield of Kepas (gms)	23.8	0.7	39.4	0.6	45.6	19.3	21.5	5.9
2 Total number of mature bolls	11.4	0.3	13.0	0.1	14	8	10	4.5
3 Kepas per boll (gms)	2.2	2.3	2.3	—	3.3	2.4	2.15	1.3
IV Yield per acre								
1 Boll weight per boll in kg/bales	1.8	0.1	1.0	0.3	2.8	2.9	2.1	4.2

TABLE 21.—Environment and the development of the cotton plant
C. PUNJAB AMERICAN P.V. 2891

Description	May-sown (20.5.34)				July-sown (4.7.34)			
	Soil		Sand		Soil		Sand	
	Un-illuminated	Illuminated	Un-illuminated	Illuminated	Un-illuminated	Illuminated	Un-illuminated	Illuminated
L. Up to 28th November 1934								
1 Total bud production	96	81	99	84	78	55	65	68
2 Total shedding	61	75	70	79	47	23	51	50
3 Interval (in days) between date of sowing and beginning of shedding	49	49	49	49	55	90	55	90
4 Period of shedding (in days)	142	142	142	142	99	58	90	58
5 Rate of shedding (per day) Item 2 by Item 4	0.43	0.45	0.43	0.56	0.52	0.43	0.56	0.57
6 Percentage of shedding on total bud production	63.5	66.3	77.8	91	60.2	71.4	77.5	62.4
7 Yield of Kepas in gms	17.8		15.4		3.8		1.5	
8 Number of mature bolls	7		8.7		2		0.5	
9 Number of green boll present on 29.11.34	11	1	2		10		8	
10 Kepas per boll (gms)	2.5		1.8		1.8		3.0	
II. From 29th November 1934 to 24th February 1935								
1 Yield of Kepas (gms)	22.1		5.6		34.1		18.4	
2 Number of mature bolls	0		3.3		14.5		6.5	
3 Kepas per boll (gms)	2.2		1.7		2.4		2.8	
III.								
1 Total yield of Kepas (gms)	39.9		21.0		38.7		12.9	
2 Total number of mature bolls	16		32.0		16.5		7.0	
3 Kepas per boll (gms)	2.5		1.75		2.3		2.8	
IV. Vegetative Growth								
1 Shoot length per bud in inches	2.1	2.7	1.7	3.3	2.3	1.9	1.2	2.5

Illumination hastened shedding in the May sown plants of Malvi and Cambodia but delayed it in all the July sowings except Cambodia in soil. The rate of shedding in July sowings was generally higher with illumination, differing in degree according to variety.

A

Total yield of Kapas—Yields were always depressed by illumination, P. A. 289F suffering most and July sown Cambodia the least

The stimulating influence of light did not extend beyond bud-production

Shoot length per bud—Shoot-length per bud was calculated by dividing the total length of all shoots as measured at the end of November by the total number of buds produced up to that time

Illumination depressed the shoot length per bud in Malvi but increased it for the American cottons

July sown cottons showed greater increase in shoot length per bud under illumination than under normal conditions. This increase was more marked in Malvi than in Cambodia. The increase was less marked in the American cottons. The increase in shoot length per bud was more marked in the first hand than in the second hand cottons.

There was a marked increase in shoot length per bud in all the cottons under illumination compared with those under normal conditions. This increase was more marked in the first hand cottons than in the second hand cottons. This increase was more marked in the American cottons than in the Indian cottons. This increase was more marked in the Malvi cottons than in the Cambodian cottons.

(c) *Crop vigour and seed quality*—Yield differences in groundnuts (taken as a convenient indicator crop) due to localities were found associated with similar differences in oil contents. Crops from different places varying in yield and oil content showed different proportions of nuts apparently of different quality

TABLE 22.—*Yield and oil content of groundnuts grown in different localities*

Variety—Akola 10

Locality	Yield in lb per acre	% in oil
Indore ..	1,666	49.5
Datta ..	3,050	49.6
Dhar ..	617	47.0
Bharatpur ..	483	47.2
Sitamau ..	...	43.6

The nuts from one crop were sorted into three grades and shelled. The kernels from each grade showed distinct differences in appearance—colour, plumpness, size and brightness and there were very large differences in the oil contents.

TABLE 23.—Differences in oil content in different grades of groundnut

Variety	Akola 10
Grade	% in oil
1st	44.5
2nd	37.2
3rd	30.3

Several replicated field trials were made in 1934 to test if such differences persisted in the succeeding crop and how differences in varietal habit and field fertility would react upon them.

Some of the results have now been examined.

TABLE 24.—Yield vigour as influenced by seed quality.

Mean yields in grams per plant

Grades	Rich field				Poor field.			
	Akola 10	Gangapur	Spanish peanuts	Total	Akola 10	Gangapur	Spanish peanuts	Total
1st grade	46.6	51.7	20.3	118.6	23.8	11.5	15.7	51.0
2nd "	29.6	40.1	17.5	97.2	24.2	13.6	16.9	54.7
3rd "	31.0	45.0	10.4	86.4	22.0	10.5	16.1	48.6
Total	120.2	136.8	45.2	302.2	70.0	35.6	48.7	154.3

Significance (1) fields (2) varieties, (3) grades P<0.05

Sig. diff. (1) 72.40, (2) 54.26, (3) 12.72

Other results are not significant

* Standard error made in 1st & 2nd field 1.1 & 0.5%

way as groundnuts

(f) Cropping power and soil characteristics

(i) Similarities of different soils.

1 profile samples were collected in the field in Dhar and Jaipur States and at Indore from Field No. 31. Those were compared among themselves and with samples taken after harvest from Cambodia cotton plots at Indore with and without heated soil treatments (50 per cent in the top 6 inches). Determinations for hygroscopic moisture (50 per cent humidity) total nitrogen and base exchange capacity were made.

TABLE 25
Similarities of different soils

Description of soil		Hygroscopic moisture % on oven dry basis	Total nitrogen % on oven-dry basis (milligrams)	Base exchange capacity mill equivalents per 100 gms of air dry soil
Dhar soil	0° 12°	6.34	40.50	49.43
	12° 24°	7.67	34.60	50.20
	24° 36°	7.20	36.70	40.20
	36° 48°	6.43	28.00	47.87
	48° 60°	7.70	23.80	50.40
Jaipur soil	0° 6°	1.31	12.7	0.65
	6° 12°	1.29	10.4	7.74
	12° 24°	2.10	10.6	11.60
	24° 36°	2.30	10.7	14.39
Heated soil treatment	0° 6°	3.40	144.00	60.22
	6° 9°	4.67	87.50	74.14
	9° 15°	5.32	86.50	72.80
	15° 21°	4.80	78.30	88.94
	21° 24°	5.01	72.00	74.28
Indore Field 31	0° 1.°	7.35	76.00	56.89
	1.° 12°	7.10	38.10	52.47
	12° 24°	7.71	28.00	58.05
	24° 36°	6.64	22.60	54.10
	36° 48°	7.48	20.20	56.04
No treatment	0° 6°	4.75	81.00	82.10
	6° 9°	4.91	66.00	80.28
	9° 15°	6.07	88.00	81.14
	15° 18°	5.81	86.00	74.92
	18° 24°	5.69	59.00	74.70

Hygroscopic moistures were less in the upper than in the lower layers in Jaipur and Dhar soils and greatest in the upper layer of Field 31. Heated soil reduced it.

The total nitrogen content of the Jaj, $\text{J} \alpha$ and Dhar soils was higher in the upper layer but at Indore in the second layer. Heated soil raised it in the upper layer. It also seems that the base exchange capacity increased up to 15 cm depth by the heated soil treatment perhaps the similar lower level in the Dhar profile is the result of similar processes as the soil type is the same.

The carbon content was less following heated soil and a Cambodia crop, it increased with manures and to a greater depth with heated soil.

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The conductivity ratio between one-month and 24 hour water extract shows reduction to a greater depth in control plots with Cambodia than with Malvi. With each variety manure and heated soil separately increased it in upper layers but no further when together.

(ii) Soil profile changes by cropping and treatments

Profile soil samples from the experiment on the influence of open surface texture were sampled after harvest and examined (Table 26, A and D).

H₂O-grosscopic moisture was reduced in the upper layers by heated soil, manure and by the growth of the Cambodia variety.

The total yield was greater in the Lambertia unmanured control than the corresponding manured plots, but not so with Malvi

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TABLE 26
Soil profile changes by cropping and treatments
A CAMBODIA
UNMANURED

Control.													
Depth,	Untilled soil.			Base exchange capacity	Depth,	Hydroscopic moisture per cent			Nitrogen per cent	Carbon per cent	C/N	Conductivity ratio	Base exchange capacity
	Humus organic matter per cent.	Nitrogen per cent.	Carbon per cent			Humus organic matter per cent.	Nitrogen per cent.	Carbon per cent					
0-5'	3.65	0.14	0.22	1.24	0.22	0-5'	5.16	0.093	0.26	2.63	1.6	82.16	
5-10'	4.54	0.18	0.25	1.92	74.14	0-5'	4.93	0.062	0.26	4.2	1.0	82.16	
10-15'	5.32	0.17	0.13	1.05	72.90	0-5'	4.90	0.005	0.40	6.2	0.2	86.28	
15-20'	4.94	0.14	0.13	1.32	85.94	0-5'	6.06	0.083	0.30	3.41	2.15	61.14	
20-25'	5.11	0.17	0.12	1.63	14.29	15-16'	8.89	0.085	0.24	3.65	1.9	74.92	
					15-24'	6.58	0.053	0.34	5.8	2.0	74.70		
MANURED													
0-5'	4.33	0.092	0.31	3.4	2.1	0-5'	4.20	0.068	0.51	3.93	2.65	86.94	
5-10'	4.51	0.075	0.23	3.65	61.54	5-16'	5.15	0.081	0.14	1.73	1.02	86.94	
10-15'	5.41	0.073	0.23	3.00	1.78	15-24'	4.6	0.073	0.15	2.02	1.21	86.94	
15-20'	5.41	0.06	0.23	4.4	1.66	63.69						67.81	
20-25'	4.74												
B MALT													
UNMANURED													
0-5'	5.64	0.170	0.57	6.4	2.15	0-5'	6.61	0.14	0.50	4.10	1.76	80.44	
5-10'	7.30	0.141	0.46	1.14	2.15	74.45	5-16'	5.58	0.11	0.60	5.33	2.35	71.18
10-15'	8.44	0.141	0.59	8.23	2.09	22.44	6-15'	5.98	0.10	0.37	3.63	2.17	68.50
15-20'	7.84	0.097	0.39	6.66	2.09	76.52	16-21'	5.84	0.10	0.34	3.92	2.63	73.56
20-25'						21-24'	6.04	0.10	0.45	4.38	2.02	74.06	
							6.14	0.11	0.42	3.62	1.85	74.58	
MANURED													
0-5'	5.33	0.097	0.73	7.5	2.24	0-5'	6.49	0.14	1.07	7.90	2.46	71.02	
5-10'	6.63	0.069	0.73	6.5	2.31	0-5'	7.22	0.11	0.74	6.77	0.61	72.44	
10-15'	7.52	0.067	0.36	5.6	2.15	0-5'	7.22	0.09	0.69	8.91	2.31	71.30	
15-20'	6.22	0.069	0.33	4.8	1.94	0-5'	7.31	0.070	0.59	6.41	2.07		
20-25'	7.42	0.071	0.33	7.5	1.80	0-5'							

The explanation of these results is being continued by the changes in soil texture
 due to the treatments selected and localised seems to be acting

(iii) *Soil moisture and crop growth*—In 1932 observations were taken to estimate the capacity for moisture retention of three typical fields at the Institute. Field 31 (black soil, two to three feet deep), Field 22 (dark grey, two to three feet deep liable to surface wash) and Field 40 (well-drained light grey and seven to fifteen feet deep). Samples of soil were taken on the 29th August from 0-3 inches depth and a month later from 0-12 inches in addition after rainless periods of two and three weeks respectively. Results are given below.—

TABLE 27

A

Mean percentage moisture (on fresh basis)

Depths of sampling	29-8-32			29-9-32		
	Field 22	Field 31	Field 40	Field 22	Field 31	Field 40
0'-3'	29.15	28.85	25.10	22.95	25.18	22.72
9'-12'				22.02	22.07	20.07

Significances	P	Sig diff
Fields	<0.01	—
Dates	<0.01	—
Depths	<0.01	—
B Fields x dates	<0.01	1.90
C Fields x depths	<0.01	1.90

B

Dates of sampling	Field 22	Field 31	Field 40	Mean for dates
29-8-32	29.15	28.85	25.10	27.6
29-9-32	22.05	25.18	22.72	23.62
Mean for fields	26.05	27.02	23.89	

C

Depths of sampling	Field 22	Field 31	Field 40	Mean for depths
0'-3'	22.95	25.18	22.72	23.62
9'-12'	22.02	22.67	20.07	21.58

TABLE 26
Soil profile changes by cropping and treatments
A CAMBODIA
UNMANURED

Depth,	Unmanured soil				Manured soil				Cultivated				
	Nitrogen exchange capacity per cent	Nitrogen per cent	Carbon per cent	C/N	Conduc- tivity ratio	Base exchange capacity	Depth	Hys- dro- gen cap- acity per cent	Nitrogen per cent	Carbon per cent	C/N	Conduc- tivity ratio	Base exchange capacity
0-6"	3.44	0.14	0.52	1.00	2.4	60.22	0.3*	5.16	0.098	0.26	2.03	1.6	82.16
6"-12"	3.45	0.09	0.52	1.02	2.04	44.14	0.5*	4.33	0.062	0.26	4.2	1.9	86.24
12"-18"	3.37	0.07	0.13	2.01	2.66	54.80	0.5*	4.40	0.065	0.40	6.2	2.0	81.14
18"-24"	4.40	0.04	0.52	3.22	1.74	59.94	0.7*	6.06	0.083	0.30	8.41	2.15	74.92
24"-30"	5.03	0.04	0.23	3.53	1.65	74.74	0.7*	5.80	0.066	0.24	8.35	2.0	74.70
MANURED													
0-3"	4.33	0.31	0.022	0.31	3.4	67.76	0.3*	4.20	0.093	0.31	3.32	2.05	66.94
3"-15"	4.51	0.31	0.023	0.33	3.83	61.56	0.3*	5.15	0.081	0.14	1.73	2.00	69.69
15"-24"	3.84	0.31	0.033	0.35	4.0	66.33	1.3*	4.6	0.075	0.15	-0.02	2.2	67.61
24"-30"	4.6	0.30	0.29	4.9	1.60	63.69							
B. MALAY													
UNMANURED													
0-3"	5.94	0.00	0.57	0.4	2.15	64.92	0-3*	5.01	0.14	0.59	4.10	1.76	69.44
3"-15"	7.24	0.04	0.46	0.46	2.38	74.48	3-5*	5.96	0.11	0.60	5.33	2.35	71.18
15"-24"	7.54	0.07	0.39	0.39	8.23	1.09	7.44	5.96	0.10	0.37	3.03	2.17	68.50
24"-30"	7.84	0.07	0.39	5.86	1.09	7.07	7.52	5.84	0.10	0.74	3.22	2.68	73.56
MANURED													
0-3"	5.52	0.007	0.73	7.5	2.74	77.94	0*-3*	6.49	0.14	1.07	7.00	2.45	71.62
3"-15"	7.02	0.072	0.77	6.4	2.31	67.49	3-5*	7.22	0.11	0.74	6.92	2.61	72.22
15"-24"	7.92	0.067	0.34	4.6	1.13	67.22	5*-15*	7.0	0.09	0.69	6.91	2.31	72.44
24"-30"	7.42	0.059	0.33	4.8	1.04	70.56	15*-24*	7.31	0.09	0.63	6.41	2.07	71.50

D

0-3 inches	6-9 inches	Significant difference
28.5	25.1	2.01

F

Area	Depths in inches				Mean for good v bad areas
	0-3	6-9	12-15	21-24	
Good	26.9	24.4	22.2	22.0	24.1
Bad	31.7	26.6	25.7	24.1	27.0
Mean for depths	29.3	25.6	23.9	23.6	

Significances —

	P	S.g. difference
Good v Bad area	<0.01	1.05
Depths of sampling	<0.01	2.20

Field 8 was in general moister than the others. The moisture was highest in the first 3 inches layer next came 6-9 inches and below one foot it remained at a constant level. Poor areas more moister at each depth in all the fields.

III. Jowar

Observations on crop growths in the same patches were taken from time to time. The cotton crops were destroyed in both years by excessive rains. The following tables (29 and 30 A-D) include the observations on jowar for 1931 and on wheat for 1933.

TABLE 29
Jowar crop—good and bad areas 1931

—	Good areas	Bad area	P	Sig diff	Between	t
Grain in gms per plant	34.9	12.4	<0.05	19.49	Grain and Heights	999
Heights in inches	76.2	53.1	<0.05	15.63	Grain and Kadbi	999
Kadbi in gms per plant	72.3	20.2	<0.05	30.2	Heights and Kadbi	999

TABLE 30

A

Mean yield in gms per plant Bheat—1933

Description	Grain		Bhusa	
	Early matured	Late matured	Early matured	Late matured
Field 30				
Patch 1	27.6	19.6	32.4	25.7
Patch 2	20.8	12.8	25.9	16.4
Field 16				
Patch 1	22.4	23.6	34.3	36.0
Field 18				
Patch 1	62.4	14.1	92.0	18.5
Patch 2	34.0	16.0	54.5	27.5
Border	20.5	42.6	24.1	51.7

Significances —	P		Sig difference	
	Grain	Bhusa	Grain	Bhusa
Early vs Late maturity				
Fields	<0.05	<0.01	—	—
Patches	<0.05	<0.01	—	—
B (Early vs Late) × Fields	<0.05	—	—	—
C (Early vs Late) × Border vs Patches	<0.01	<0.01	1.42	—
D (Early vs Late) × Fields × Patches	<0.01	<0.01	1.27	1.67
	—	<0.05	—	3.05

B

Type of maturity	GRAIN				BHUSA			
	Field 30	Field 16	Field 18	Mean for early and late	Field 30	Field 16	Field 18	Mean for early and late
Early	3.02	2.80	6.03	3.91	3.61	4.20	9.16	6.49
Late	2.03	2.05	1.89	2.68	2.63	4.50	2.80	3.66
Mean for Fields	2.52	2.85	3.93		3.14	4.39	6.01	..

C

Type of maturity	GRAIN		BHUSA	
	Border	Patches	Border	Patches
Early	2.56	4.18	3.01	5.98
Late	5.33	2.15	6.46	3.13
Mean for border and patch	3.94	3.16	4.73	4.55

D

Type of maturity	BHUSA			
	Field 30		Field 18	
	Patch 1	Patch 2	Patch 1	Patch 2
Early	4.05	3.24	11.50	6.81
Late	3.21	2.05	2.31	3.44

these late maturing plants inside the field yielded less than early plants around them.

Comparing the two groups of late plants the lateness of the moist patch plants seems to be due to their weakened vigour, that of the border plants is not due to weakening but presumably to their ability to tap more water in the absence of competition, and in spite of their prosperous appearance their yield is only equal to that of the early plants inside the field.

It appears that vigour and health of crops are determined by the soil capacity for free water movement in wet weather in the first foot and moisture retention in dry weather. This is why texture improvement by humus supply shows superiority over other methods.

The ability of Badnawar (Dhar)

The usual mechanical and chemical analyses were made, and hygroscopic moistures, maximum moisture-holding capacity, and available potash and phosphates were deter-

D.

Ratios of available nutrients in the first zone.

Soils	N to av P ₂ O ₅	N to av K ₂ O	av P ₂ O ₅ to av K ₂ O	Available		N to In- org av. P ₂ O ₅	N to org P ₂ O ₅
				Inorg P ₂ O ₅ to K ₂ O	Org P ₂ O ₅ to K ₂ O		
Jaipur	1.73	0.52	0.30	0.05	0.25	11.06	2.06
Badnawar	1.01	0.96	0.97	0.21	0.75	4.61	1.20
Indore	1.08	1.25	1.16	0.28	0.88	4.56	1.42

The proportion of coarser fraction was greater and that of clay less in the top zone than below in Jaipur and Badnawar soils and *vice versa* in Indore soils

Carbonates gradually increased with depth in Jaipur. In Badnawar soil the percentage was high in the top zone and low in the Indore soil, in each it then alternated in successive lower layers

Similarly the available proportion of total potash was highest in Jaipur and lowest in Indore soils

In Jaipur and Badnawar soils much more potash was available in proportion to nitrogen than in Indore soils. In the same way, in proportion to phosphates, both organic and inorganic, the largest amount of potash was available in Jaipur soils and least in Indore soils.

These differences seem to be interesting in the light of the results discussed in the cotton wilt section of this report (9) (a) and those on nutrition (9) (b), (c) and (d)

10 CROPS OTHER THAN COTTON.

During the last decade or one or two work has been started on Jaya (Millet), Tur, Linseed and Gram. They are very encouraging.

(b) Botanical.—The developmental study of bread and durum wheats was carried out in the rabi season, and the data await analysis. It is not expected that any further experimental work will be required.

mined the latter in inorganic and organic forms. Some of the outstanding differences are noted below --

TABLE 31

*Differences in profile characters***A MECHANICAL**

Percentage of	Jaipur profile		Badnawar profile		Indore profile	
					Field 31	
	1st zone 0-6"	2nd zone 6"-15"	1st zone 0-12"	2nd zone 12"-24"	1st zone 0-12"	2nd zone 12"-24"
Coarse sand	2.73	1.92	0.80	0.68	0.24	0.87
Clay	6.15	7.35	16.35	29.90	41.60	35.95
Cos	0.02	0.02	2.53	1.58	0.44	1.45

B CHEMICAL*Available in the first zone*

Soils	Per cent Total N	Per cent available P_2O_5	Per cent available P_2O_5 on total	Per cent on available P_2O_5		Ratio org to Inorganic P_2O_5
				Inorganic P_2O_5	Organic P_2O_5	
Jaipur	0.013	0.0075	19.95	16.00	84.00	5.25
Badnawar	0.041	0.0407	28.87	21.87	78.13	3.59
Indore F 31	0.036	0.0332	47.69	23.74	76.26	3.21

C*Available potash in the first zone*

Soils	Per cent available K_2O	Per cent available K_2O on total K_2O
Jaipur	0.0248	22.15
Badnawar	0.0410	7.26
Indore	0.0287	5.51

D

Ratios of available nutrients in the first zone

Soils	\ to av P ₂ O ₅	\ to av K ₂ O	av P ₂ O ₅ to av K ₂ O	Available		N to In org av P ₂ O ₅	N to org P ₂ O ₅
				Inorg P ₂ O ₅ to K ₂ O	Org P ₂ O ₅ to K ₂ O		
Jaipur	1.73	0.52	0.30	0.05	0.25	11.06	2.06
Badnawar	1.01	0.96	0.97	0.21	0.76	4.61	1.29
Indore	1.08	1.25	1.16	0.28	0.98	4.56	1.42

The proportion of coarser fraction was greater and that of clay less in the top zone than below in Jaipur and Badnawar soils and *vice versa* in Indore soils

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These differences seem to be interesting in the light of the results discussed in the cotton wilt section of this report (9) (a) and those on nutrition (9) (b), (c) and (d)

10 CROPS OTHER THAN COTTON

(a) *Plant Breeding* — Study of the crops of Central India and Rajputana immediately

encouraging

(b) *Botanical* — The developmental study of bread and durum wheats was carried out in the rabi season and the data await analysis. It is not expected that any further experimental work will be required

(c) *Cytological* —The development of more profitable lines of work has made necessary the postponement of work on the chromosome number of gram. Chromosome numbers of Indian and Moroccan linseeds were determined in root tip material and were found to be the same in both types.

(d) *Fodder Plants* —A list of the natural fodder plants occurring in the neighbourhood of the Institute has been compiled, and is available for the assistance of those engaged in agronomic work on fodder improvement.

(e) *Tobacco* —The new seed is being

types
The
lity
d to

ing to make up for the loss of the crop by frost wherever one or two irrigations can be given. It is also considered that tobacco cultivation can be made more profitable by systematic ratooning of a normal crop.

(f) *Sugar-beet* —Closer spacing increases yields. The crop responds well to artificial manures. The ease and practicability of drying a crop on a large scale has now been proved. The hand slicer designed at Indore has proved very satisfactory.

taken as a
ible to grow
the Indore
possible to

(g) *Sugarcane* —The new seed is being

turing and irrigations, ratoon-

(h) *Lucerne* —It has been found possible to reduce the cost of seed and irrigation by drill sowing and implement culture. Good viable seed has now been produced locally.

(i) *Preliminary small growth tests on various crops* —Kudzu vine, holmes tepeary beans and jute are being grown. Teff grass seems to appear again. Cotton in Malwa

11. STATISTICS AND FIELD-TRIAL TECHNIQUE

Four papers on the techniques of field trials

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In the season under review the randomised block technique was successfully applied to the problem of testing progeny rows in plant breeding work. Problems arising out

of the necessity of using very small plots, the very different amounts of seed available in different progenies, and the effect of dispensing with plot margins are being studied, and the first results will be ready for publication shortly.

12 MISCELLANEOUS

(a) *Igrometric studies* — A great deal of information has been collected about the

(b) *Soil erosion* — Experience has shown that the system on which the Institute

is built, tried extensively to adapt it to local conditions. A number of plants have been tested for this purpose.

(c) *Eradication of kans and other weeds* — It was noticed in the most recent experiments that compost thoroughly covered the soil showed the killing to the weed control.

(d) *Dry farming and humus supply in arid regions* — Following up the results of qualitative tests on the Jaipur State Farm replicated experiments are now laid down to find the best way of retaining the deficient rainfall so as to make possible cotton and other such crops by ensuring the necessary water-balance in the crop up to maturity.

(e) *The use of phosphatic compost for the satisfactory growth of cotton in local black soils* — The efficacy of Americ supplied in combination with phosphatic compost.

A simple technique has been devised to make heated soil cheaply in the field with the help of available crop residues.

(f) *Poisoned baits for white ants, etc* — The composition of the baits has been improved to make them more attractive and efficacious. Field trials are in progress to determine utility and cost.

13 COMPOST MANUFACTURE

use of cattle dung and composting is being introduced with initial success in Military stations in the Holkar State.

The method of charring and crushing bones for use as manure either alone or in the form of compost has been systematized.

It has been found possible to reduce by about 50% the quantity of cattle manure required for a given area.

addition of such material does not seem to affect the quality of the compost. The extra expenditure and manipulation involved appear to be of doubtful utility in practice because in any case such larvae are destroyed after the first turn if the process is properly carried out.

Widespread interest has been displayed in the process by Public Health Officers, Municipalities and others both in India and abroad, enquiries are constantly being received, over 500 copies of the Bulletin (No 1) describing it have been sold and the first edition of 1,600 copies is now exhausted.

(c) *Use of compost*—A method has been devised and is being tried on a field scale to raise the fertility of *barani* (*mal*) lands more nearly to the level of that of garden lands (*adhan*) by applying manure or compost uniformly in the deeper layers in addition to surface dressings.

14 PUBLICATIONS.

The following papers have been published or submitted for publication.

"The health and vigour of the cotton plant in relation to its environment"—Report 2nd Conf on Cotton Growing Problems, July 1934, Empire Cotton Growing Corporation

"Silage making in Mud-walled Towers"—G C Tambe and Y. D. Wad; Empire Cotton Growing Review, XI, 1934, No 4

"Humus manufacture from cane trash"—G C Tambe and Yeshwant D Wad; International Sugar Journal, XXXVII, 1935, pp 260 263

"Some observations on the Inheritance of Form and Size in Asiatic Cottons", by J B Hutchinson (To be read at the VIth International Botanical Congress Amsterdam September 1935)

"The Classification of *Gossypium* with special reference to the cottons of the Old World," by J B Hutchinson and R L M Ghose

Studies in the Technique of Field Experiments, by J B Hutchinson and V G Panse

(I) "Size shape and arrangement of Plots in Cotton Trials"

(II) "Sampling for Staple Length Determination in Cotton Trials, with a Note on the Standard Error of Estimates of Ginning Percentage"

(III) "An Application of the Method of Co-variance to Selection for Disease Resistance in Cotton"

(IV) "A Study of Margin Effect in Variety Trials with Cotton and Wheat"

"A Note on the Inheritance of Sterility in Cotton" by J B Hutchinson and P D Gadkari

"Nitrogen Balance in Black Cotton Soils in the Malwa Plateau II" by Y. D. Wad and R K Aurangabadkar

Institute leaflets issued or revised during the year —

No 5—"Improved method of gur manufacture" (English and Hindi, illustrated)

No 7—"Lucerne Cultivation" (English and Hindi)

No 9—"Cultivation of cotton in Gang Canal Colony" (Urdu)

No 10—"The Preparation of Bone-char Manure" (Eng)

No 2—"The making of Rain watered Compost Manure from Farm Wastes" (English and Hindi) Revised June 1935, with one illustration

The following papers were read at the 1935 Session of the Indian Science Congress
Calcutta —

Influences dominating cotton yields in Monsoon Areas—I by Kubersingh and
Y D Wad

Nitrogen Balance in Black Cotton Soils in the Malwa Plateau—III by Y D Wad
and R K Turangabadiar

Provision of Succulent Todder for Work cattle in Central India by G C Tambe
Chiranjit Nagar and T Krishnamoorthy

Agronomic Adjustments of the cotton crop in Gang Canal Colony Bikaner State
by Shamsher Singh and Y D Wad

THE WORKING OF THE FARM

15 EXPERIMENTAL WORK

(a) *Nature of the season* —

the sowing started on the 26th
The fall up to the end of July
The next month was equally w
In September 16 inches of rain
rain November 5th recorded
four days The temperatures recorded were as follows —

1935 January	12	50° F
13	40° F	
14	34° F	
15	29° F	
16	29 5° F	
17	31 5° F	
18	31 5° F	
19	37 5° F	

(b) *Field Trials* —The following experiments were conducted on the Farm —

Humus supply —(1) Incorporation of organic matter in the soil (2) Effect on
wheat of green manuring with sann at different stages (3) Improvement of
water logged soils for rabi crops

Soil improvement —(1) Improvement by the application of lightly heated soil
(2) Control of soil erosion by contour line sowing and the use of arrester crops

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inter cultivation of crops (1932 1933 1934 1935)
the importance of weeding and interculture
efficiency of different implements of inter

Rotation —(I) Rotation of crops (1932 1933 1934 1935)

Associated growth of crops —(1) Association of cotton with soya beans and cowpeas
(2) Spacing test on tur and its association with cowpeas

Weed eradication —(1) Eradication of kans by chemical means

Treatment of seed —(1) Trial of Agrosan G against Jowar smut

Multiplication of seed —(1) Soya beans of 32 varieties in Kharif (2) Soya beans of
6 varieties in rabi (3) Paddy varieties 7 (followed by wheat)

Paddy variety	Date of harvest	Paddy yield mds	Wheat yield mds
Shahjanpur 23	210 31	12.0	8.68
Shahjanpur 1		15.7	9.83
		9.3	9.00
Johna		10.6	12.40
		12.5	10.30
		4.3	6.70
Dattat		20.3	6.70
	151034	16.0	4.60
		15.4	4.15
Bhatta Gurmatia	291034	11.4	4.27
		16.3	4.80
		14.4	4.50
Mushkan	81034	14.9	4.66
		12.6	10.00
Pahan	101034	17.2	5.40
		9.0	5.45
	,	4.2	7.60

Paddy not irrigated

Wheat—2 irrigations

Small growths —(1) Oats for fodder (2) Bagilla fodder

Sugarcane —(1) Multiplication of promising acclimatised Coimbatore varieties and also Sorghum crosses (2) Varietal trial on S48 Co210 Co213 Co281 and Co290 (3) Agronomy trial on S 48

Lucerne —(1) Inoculation of seed (2) Manurial trials (3) Agronomy trial

Sugarbeets —(1) Trials in different soils under dry and irrigated conditions

Pasture Studies —(1) Response of grasses to various manures

Compost —(1) Preparation of phosphatic compost (2) Composting cane trash (3) Composting cowdung alone

16 Crops and Yields

		Yields in mds	Per acre
		Max	Min
<i>Dry crops</i>			
Cotton		3.6	1.4
Jowar		0.7	0.4
Tur		5.4	0.3
Groundnuts—			
Gangapuri		13.1	1.1
Akola 10		5.5	0.9
Wheat (Malvi)		5.5	2.0
Gram (Malvi)		5.0	1.0
Linseed		4.5	3.7

			Yields in mds Max	Per acre Min
<i>Irrigated crops —</i>				
Paddy (mushlan)			29.0 mds	12.6 Plot size 50×20
Sugarcane	Co210		534.6	
	Co213		464.7	
	Co281		445.0	
	Co290		610.9	
	S 48		318.7	
<i>Lucerne agronomical</i>				
<i>Year</i>	<i>Season</i>	<i>Cuttings</i>	<i>Plot yield in lb</i>	<i>Total per acre in lb</i>
1932-3	Winter	2	5 480	
	Summer	6	27 876	
	Monsoon	3	7 180	
				45 040
1933-4	Winter	4	10 133	
	Summer	5	10 053	
	Monsoon	2	3 443	
				26 250
<i>Lucerne manorial</i>				
1932-3	Winter	1	5 307	
	Summer	5	23 513	
	Monsoon	3	4 129	
				47 070
1933-4	Winter	4	9 189	
	Summer	6	13 858	
	Monsoon	2	4 563	
				39 470
Peas (green pods) seed		8.8 mds		
		2.0		

The calculated gross returns from the Farm amount to Rs 5 000. The wet weather coupled with the cold wave reduced this figure seriously.

460 cartloads of compost were prepared from the available farm wastes and 32 cart loads of night soil compost from the residential block (population about 100).

1 145 mds of silage from grass and legumes were made. This provided an excellent succulent fodder for the hot weather.

(b) Workshop — This section continued to render useful service in the same directions as reported last year. The sugarbeet slicer devised in the previous year was further improved upon.

A portion of the fence line was repaired and the wood work of the buildings repainted.

(c) Irrigation — A persian wheel was installed in place of the Boulton Elevator worked by engine power for purposes of demonstration and economy.

¹ One of the wells capable of commanding a fair area had been out of use on account of its dilapidated condition. The debris was removed and the well cleaned and repaired. Now there is one good well and two of moderate capacity in the 'C' block of the farm.

(d) *Trading Section*—This section was very busy and considerably more sales than those of the last year were effected in implements, tools and seeds. The demand for the improved seed exceeded the supply.

(e) *Training of students and help to cultivators*—In all about 120 students from the following States were given training in either practical agriculture or composting farm and habitation wastes.—

Alwar	Rewa	Hyderabad (Dn)	Bundi	Tonk
Chhattarpur	Udaipur	Jodhpur	Indore	
Jaora	Bharatpur	Rutlam	Nowrang	

According to the status the students can be classed as under.—

Normal School Boys	75
" " Teachers . . .	3
State officials connected with agriculture ..	12
Municipal officials and memials ..	10
Army officers Holkar State	6
Union Theological Seminary students for rural propaganda	15

Trained ploughmen were deputed to various States to teach compost making and *gur* making by the improved method. Many cultivators came directly for information and help showing their confidence in the work.

PROPAGANDA AND EXTENSION WORK IN STATES

18 *Visits to States*—During the year under report, the Agricultural Adviser made sixteen visits to States. The Extension Officer nineteen, the Geneticist and Botanist seven, the Chemist and Agronomist eleven, and other officers thirteen.

19 *Visits to Institutes*—The Agricultural Adviser made six visits to Institutes.

Special lectures and demonstrations were arranged for repeated visits from the Kumars of the Daly College (for sons of the Ruling Princes and their relatives) and from the students of the Canada Mission's Theological Seminary, their Rasalpura Vocational School and the Holkar State's Normal School for training rural teachers. Such contact with those who will later be able to encourage agricultural improvement is a matter of great importance.

With the co-operation of the Indore Residency Area authorities training in the Sanitary disposal of habitation wastes by the Institute's composting process has been given to municipal staff from seven member States. The work is now being carried out at Nowrang Cantonment, Holkar State, refuse The S for a month to and to help in laying out of new disposal grounds under the system.

Lectures and demonstrations were given by the Extension Officer in district tours in eight States. To large village audiences he explained the advantages of growing good crop varieties, of increasing their manure supply by making rain-watered compost from

at the disposal of the Darbars and were freely used

Assistance was also given by the Extension Officer in organising demonstrations at twelve agricultural shows and cattle fairs in eight States. Illustrative exhibits were provided, lectures given and cinematograph films shown on agricultural and rural uplift subjects accompanied by running commentaries

At a public meeting in Jaipur presided over by Lt-Col Sir H Beauchamp St. John, K.C.I.E., C.B.E., Vice-President, Council of State, the Extension Officer explained the work and objects of the Institute to a large audience of landowners, State officials and cultivators, cinematograph films were also shown

Acknowledgment is due to the Indian Central Cotton Committee and the Central Publicity Officer, Railway Board, for the free loan of films

F K JACKSON,
Director.

STAFF AND RESEARCH STUDENTS OF THE INSTITUTE OF PLANT INDUSTRY AS ON
JUNE 30TH 1935

Administrative and Clerical —

Director and Agricultural Adviser
to States in Central India and
Rajputana

Personal Assistant
Head Clerk and Accountant
2nd Clerk
3rd Clerk
4th Clerk
5th Clerk
Artist
Librarian

Γ Keith Jackson	N D A (Hons), Dip Agn
(Cantab)	
A N Srivastava	M Sc
G M Nadkarni	
Mohammad Khan	
S M Ajmu	
S M Azim	
V R Shirsath	
S J Oncar	
Bashir Husain Khan	

Botanical —

Geneticist and Botanist
Senior Botanical Assistant
Plant Breeding Assistant
Botanical Assistant
Statistical Assistant
Genetical Assistant
Computer
Fieldman
Research Student

J B Hutchinson	M A (Cantab)
R L M Ghose	M Sc
Kuber Singh	B Ag
vacant	
V G Panse	B Sc
Bholanath	M Sc
S A Khargonkar	
E L Rajanna	
G K Govande	M Sc *
M A Ansari	M Sc *
P D Gadkari	M Sc *
Maya Prakash Singh	M Sc †
B S Kochrekar	B Ag †

Chemistry and Agronomy —

Chemist and Agronomist
Laboratory Assistant

(Temporary)

Research Assistant

Research Student

Y D Wad	M A M Sc A I I Sc
L N Desai	B Sc
G T Shahane	
V V Dravid	B Sc
S J Ghose	
G K Sant	B Sc
P N Kulkarni	B Sc
B Goswami	B Sc
R S Gharpure	B Sc
I Madhusadan Rao	M A
Churonjilal Nagar	B Sc
V N Bhargave	B Sc
R K Aurangabadkar	M Sc *
S C Chakravarthy	M Sc *
K N Ambegaonkar	M Sc *
S B Mogre	M Sc *

Propaganda and Extension Work —

* Extension Officer

M L Saksena L Ag

* Inst. title of Plant Industry Studentship

† Voluntary research worker

Farm Executive —

Farm Superintendent	G C Tambe B Ag
Assistant Farm Superintendent	S C Talesara B Ag
Junior Farm Assistant	G G Phadke L Ag (on deputation to Bharatpur State as Agricultural Officer) N S Apte B Ag (Actg)
Fieldman	K M Simlote B Ag Aihalsingh V R Sathe
Storekeeper	G M Nigodkar V S Destrud

INSTITUTE OF PLANT INDUSTRY INDORE*Research Programme for 1935-36***A GENETICS AND BOTANY SECTION****COTTON**

(1) *Botanical Survey*—Owing to delay in despatch of the specimens promised by the Botanical Survey of India the contemplated paper on the classification of Asiatic cotton will probably have to be completed in 1935-36.

(2) *Genetics*—Study of inheritance of major factors in Asiatic and Indian American cottons

Study of cases of abnormal inheritance of major factors

Study of the inheritance of quantitative characters

Study of interspecific hybrids with special reference to the bearing of heterosis on plant breeding procedure

Study of the rate of mutation in mutable strains

(3) *Cytology*—Study of sterile types derived from an interspecific hybrid (G arboreum \times G herbaceum)

Study of chromosome behaviour in F1, F2 and backcrosses of G africanum \times cultivated Asiatic cottons

(4) *Physiology*—Study of cotton hair characteristics

Development of tests for lint quality suitable for the needs of the plant breeder

(5) *Selection and Breeding*—Propagation and distribution of Malvi 9, Study of variance in Malvi 1, Malvi 9 and the cross between them and re selection for further propagation according to the results obtained

Study of and re selection in progeny rows of 1933 selections

Study of problems of transference of herbaceous quality to Malvi type

Study of Cambodia selections grown at Badnawar

Study of selections in Nimar desh made in 1933 and grown in 1934 at Dhamnod

(6) *Variety Trials*—Variety trials will be laid down at the Institute and in the territory of member States as found necessary in the light of results obtained from current trials

(7) *Statistics*—The investigations in progress into statistical problems involved in field testing strain testing where very small quantities of seed are available and in the examination of segregating progenies will be continued

OTHER CROPS

Work on other crops will be largely confined to the selection and purification of desirable high yielding strains for the main areas served by the Institute and fundamental research will be restricted to cotton. Exceptions from this rule will occur from time to time as may be done tent

- (1) *Botanical*—Comparative developmental study of durum and bread wheats
- (2) *Genetics*—Study of inheritance of certain characters in local durum wheats
- (3) *Selection and Breeding*—Selection and breeding work will be continued on the following crops—

Kharif —

Jowar
Bajra
Tur
Tilli
Niger
Groundnut

Rabi —

Wheat
Barley
Gram
Linseed
Kesari
Safflower

A part at least of the breeding material in these crops will be grown on the farms of member States

(4) *Variety Trials*—Variety trials on all crops of interest to member States will be laid down in the light of information gained from the current season's experiments

(5) *Lathyrism*—Work on Kesari has been resumed and in connection with it the botanical and agricultural problems involved in the growth of the associated weeds responsible for lathyrism will be studied

B—CHEMISTRY AND AGRONOMY SECTION

Continuation of the present work

Reviewing of accumulated data and writing up the summarised results

The main feature of the future programme will be considerable increase in laboratory and cultural work side by side with accurate field observations in addition to extensive field experiments of a complex nature. In many cases suitable technique is not available and will have to be evolved.

Bio-chemical studies on "mild"—The information so far collected will be summarised and further studies will be started to elucidate changes both in the plant and soil which seem to favour the incidence and progress of the disease

for publication

Crop vigour and seed composition—This work is to be continued. Studies similar to those on groundnut will be made on linseed and wheat for comparison with those on cotton. The work projected in the 1934-35 programme on *Reaction changes in sap* and on *Ripening of cotton bolls* has been suspended, in favour of soil fertility studies which seem likely to give profitable results earlier.

Other factors—The preliminary results will be reviewed for publication and further work planned mainly with a view to get an estimate under controlled conditions of the disturbances in vigour and health of *desi* and American cottons commonly observed in the field. A study will also be made if possible, of the likely share, in determining the health and vigour of the cotton plant of disturbances in the respiration of roots which appear to take place in the field.

A beginning will be made to study the relative influence of the course of nutrition in potcultures and field experiments.

Nitrogen-balance in the field—Further aspects of this problem will be taken in hand.

General soil studies—Results will be summed up for publication.

(1) Three more soil types in their important phases will be taken up. The soils in hand will be examined further.

(2) Soil samples from field experiments will be examined.

(3) Water regime of the black soils of Malwa during rains and the arid soils of Bikaner throughout the year will be studied in a preliminary way.

(4) The movement and changes in the solubles will be similarly studied at both places, with special stress on important environmental phases usually prevailing in the local cotton fields during the season.

(5) The study of the alterations by surface treatment of the soil profile as well as the influence of the growing crop upon it will be pushed further.

(6) The changes and fluctuations in soil properties at different periods of the crop season will be estimated item by item.

Soil studies in relation to plant growth—(1) Attention will be concentrated on estimating the influence, on the final yield of the local cotton crop, of the several checks during wet spells and the extent to which they may be affected by soil conditions.

(2) The work already in hand upon plant growth in rich and poor patches in the same field is to be continued with a few alterations.

a profitable and convenient system for the farmer.

Water-logged soils and erosion—A few fields will be put under the control methods found promising in order to estimate the rate and extent of probable improvement in fertility.

therefore 191 336 acres as against 163 358 acres of last year. The Gadag Sale Society also distributed 122 497 lb of *Gadag No. 1* seed enough for 12 250 acres outside its own area of operation. The total area under *Gadag No. 1*, therefore came to about 102 500 acres.

seed enough for 43 134 acres has been stocked for the coming season.

Both *Jayawant* and *Gadag No 1* continued to be appreciated by the buyers who gave on an average Rs 4 more per *Agga* of seed-cotton (1,344 lbs) for *Jayawant* and Rs. 12 per *Agga* for *Gadag No 1* in auction sales.

148 000 acres in the preceding year It has increased considerably during the current year
1935-36

Three main classes of cotton—Three main classes of cotton have been found to be successful in Sind viz (a) Sind deshi (b) Sind American (c) Imported Egyptian

Among each of these three main classes the Department of Agriculture in Sind has by botanical selection evolved improved strains which on account of better yield, high ginning outturn or superior quality are suitable for extension in general cultivation in the different cotton growing tracts of the Barrage areas.

total
Duri
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stra
on a
the c b ~~most important~~ These are —

Sind American 4F-28 — It has a staple length of $\frac{1}{2}$ " to $1\frac{5}{16}$ " and spins 34 s. It has a ginning outturn of 33 34 per cent and gives a high yield. This improved strain has been found to be the most suitable type for cultivation in the new cotton growing tracts being established on the Right Bank of the Indus.

The high premiums in price obtained for Sind American cottons during the season 1934-35 have resulted in considerable increase of area under these cottons.

Imported Egyptian and Sea Island cottons—Selected strains of these cottons acclimatised in Sind have been produced by the Sind Agricultural Department viz (1) *Sea Island 24* (2) *Ross III 16* (*Egyptian*) have a staple length of $1\frac{1}{2}$ " to $1\frac{1}{4}$ " and are suitable for spinning 60-50 s and (3) *Ashmoun 37* (*Egyptian*) has a staple length of $1\frac{1}{2}$ " and is suitable

for spinning
to grow
white an

per acre in comparison with about 1.2 maunds obtained with Sind American on good lands. The staple of these fine quality cottons is fine and strong. They require better cultivation than Sind American or deshi cotton and should be grown on the best portion of the area to be put under cotton. During the year 1934-35 about 150 acres only were grown to these cottons but during the current season 1935-36 the area has increased to 2,400 acres.

Sind Deshi cotton—This cotton has a special market of its own on account of its bright colour and rough feel being suitable for mixing with wool. It is very hardy and resists variations of soil, climate and season. It is capable of giving high yields and can be sown

THE ECONOMIC SIDE—The economic side of the question which is of primary importance to the grower depends largely upon the prices prevailing for the various types of cotton. During 1934-35 these cottons were sold in large quantities at the following rates—

Variety	Price of cotton lint	
	Per maund of 82 lb	Per khandy of 784 lb
SIND AMERICAN —		
4F 99	25 0 0	238 4 0
280F 1	27 0 0	257 5 0
SIND EGYPTIAN AND SEA ISLAND —		
<i>Sea Island 2 4</i>	44 7 10	424 0 0
<i>Boss III 16</i>	44 7 10	424 0 0
<i>Ashmount 37</i>	37 10 8	359 0 0
<i>Sind Deshi 27 W N</i>	15 8 0	147 11 5

The price of Broach cotton was Rs. 229 when Sind Egyptian and Sea Island cottons were sold at the above rates.

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ong
ons

therefore 191 336 acres as against 163 358 acres of last year. The Gadag Sale Society also distributed 122 497 lb of *Gadag No. 1* seed enough for 12 2'0 acres outside its own area of operation. The total area under *Gadag No. 1*, therefore came to about 102 590 acres.

In previous year's crop by very heavy rains in the Krishna river 903 000 acres seed enough for 43 134 acres has been stocked for the coming season.

Both *Jayawant* and *Gadag No. 1* continued to be appreciated by the buyers who gave on an average Rs. 4 more per Naga of seed cotton (1,344 lbs) for *Jayawant* and Rs. 12 per Naga for *Gadag No. 1* in auction sales.

On the 1st of December 1934 the annual

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(
(
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1935-36

Three main classes of cotton — Three main classes of cotton have been found to be successful in Sind viz (a) Sind deshi (b) Sind American (c) Imported Egyptian.

Among each of these three main classes in Sind has by botanical sale ginning outturn of different cotton

Sind American cotton — Total area of 902 000 acres out of the

Original material. These are —

Sind Amer — It is found to be the established on

Sind Amer — It is found to be the established on
pr.
gr.
a — given to it

The high premiums in price obtained for Sind American cottons during the season 1934-35 have resulted in considerable increase of area under these cottons.

Imported Egyptian and Sea Island cottons — Selected strains of these cottons acclimatised in Sind have been produced by the Sind Agricultural Department viz. (1) *Sea Island 24* (2) *Boss III 16* (Egyptian) have a staple length of 1 $\frac{1}{2}$ " to 1 $\frac{3}{4}$ " and are suitable for spinning 60-50 s and (3) *Ashmouni 37* (Egyptian) has a staple length of 1 $\frac{1}{2}$ " and is suitable

74
ac
cc
st
fa
khandy of 500 lb in the market on the date of sale

Karungam
was 1,330 ac

The area under these strains covered by natural spread is estimated to be 117,748 acres. It is proposed gradually to replace this strain by another promising strain Koulpatti No 1 (Karungam) Seed of the new strain for growing nearly 500 acres in the coming season has been obtained.

H Northern and Western tract — A Northern — On account of the very limited

good season, an average yield of 300 lb per acre was obtained, as against about 70 lb per acre in the previous year. The premium paid by Messrs Binny and Co was Rs 10 to Rs 15 per khandy (500 lb).

B Westerns — The area of seed farms maintained and sown to H 1 was 3,588 acres as compared with 2,895 acres in the previous year. 291,233 lb of H 1 seed were distributed in 1934-35 as compared with 223,300 lb in the previous year.

acres
parec
favor
per acre as against 150 lb in the previous year

By means of co-operative marketing, 600 bales of H 1 lint was sold by ryots assisted by this Department and the premium realised ranged from Rs 3 8 to Rs 5 per bale of 400 lb. The fall in the premium is due to the poor quality of lint caused by low rainfall.

Agricultural Department in collaboration with the Indian Central Cotton Committee has launched a five years scheme for increasing the proportion of finer varieties that can compete in the world market

The total area under *Verum* cottons during the past season was 107,200 acres compared with 89,000 acres in the preceding year

United Provinces — C 520 This cotton is spreading rapidly and reached 14,431 acres during the year under report

A 19 seed sufficient to cover an area of 28,383 acres was distributed during the year from departmental and private agencies

C 402 — Owing to unfavourable weather conditions in the season 1933-34 the cotton area sown in the Sarda Canal suffered and the produce obtained was very poor. The each and 100 made growers

through the Society. This however scarcely compensated for the very low yield got from this cotton. The area under this cotton in the Sarda Circle in the year under report was 2,746 acres

Punjab — The total area under American cotton in British Districts was 810,700 acres as compared with 809,120 acres in the preceding year. Of this 4 F was grown on 769,700 acres and 289 F was reported to have been grown on 56,000 acres

2. The total area under *desi* cottons in the province (excluding Indian States) was 1,500,300 acres against 1,640,300 acres in the last year. *Mollison* — a selection of the *Indicum* variety — was grown on 727,200 acres whilst a type of improved *Rossum* covered an area of about 62,000 acres

3. Area — 14,431
PROVINCE
Punjab under a scheme
of Cotton Committee
been evolved. Some
cotton crop of the

Amongst *desi* cottons the most important selection produced so far is 15 *Mollison*. This cotton selected some years ago for its uniformly good yield is now the chief commercial *desi* cotton of the Canal Colonies.

Amongst the new Punjab American cottons is the variety known as 43 F. This variety is a very distinct one. It is resistant to the attack of jassids and has a high yield.

BURMA — (1) *Myingyan Circle* — The total area under improved departmental cotton was 3,700 acres all of which was not sown to the new strain. The resulting crop gave an average outturn only 32 per cent. The total quantity being Central Farm ginnery was 127,305. are available for distribution.

At the Mahaung Central Farm the improved C/19 white flowered strain was again tested against the one mil of previous year so over on the

Laboratory, Bombay in the previous year. Consequently these two strains are being tried out in the districts and multiplied. The report of the Technological Laboratory is repeated for information.

Cotton.	Staple length inch	Highest standard warp counts	Value above or below contract rate for Broach Extra Superfine @ Rs 182
C/19	1"	10	Rs 20 off
C/19 x W5	11/16"	13	Rs 15 off
LII x B6	1"	20	Rs 10 off

Mr. Gopal Chandra - In the West Central Circle the cotton crop of importance is

Distribution of the seed of three improved Wagale strains was made in Thayetmyo Minbu and Pakokku Districts. It is reported that the yields in all the places were satisfactory.

Rajpipla State—The Rajpipla State has continued its policy of maintaining the quality of the cotton crop throughout the State. No other variety is available for distribution. The annual distribution of selected seed is controlled by the Cotton Transport Act which classifies the State for purposes of sowing Goghari cotton seed or any other short staple seed and (3) by the control of ginning and pressing factories for the prohibition and prevention of admixture of short staple varieties with the pure 1027 A L F crop of the State.

As the cotton crop of the Surat District wherewithal the supply of the seed of 1027

A L F variety is distributed throughout the State. The short staple cotton is sold at some forty to fifty rupees per quintal. The Districts to sell it have achieved a good market for it that is comparatively good.

prices

Besides this measure has stimulated the growth of meetings for the sale of the cotton crop to the highest customer at various agricultural centres in the State, and this has resulted in cultivating a spirit of combination in the cultivators to dispose of their agricultural produce at the best prices available.

Rajpipla cotton (known by the term Jagadia cotton in the market) is now recognised

As no pedigree seed of 1027 A L F was available from the Bombay Department, seed separately ginned under Departmental supervision, from the registered growers was distributed to 433 registered seed growers in 4 groups and this is expected to cover about 5,000 acres.

(2) Baroda District—The cotton area covered by the Baroda District, Baroda & cotton Durin cover an area of a good deal of B organised work could be done.

(3) Mehsana District—Attempts are being made to introduce Wagad No. 8 in place of local Wagad. 2,100 lb of Wagad 8 pure cotton seed was supplied to the cultivators but severe frost has interfered in getting any results.

(4) Amreli District—Dhuha No. 1 is being recommended for this part and 57,930 lb of seed cotton was supplied to the cultivators covering about 3,500 acres by the Amreli Pedhi and Cotton Seed Supply Association.

HYDERABAD STATE—1. Gaoari Tract—Distribution of Gaoari seed in the protected area was continued. 1,169,338 lb of seed for an area of about 73,030 acres was purchased by the Agricultural Department and distributed on Tatas loan system to cultivators in the Nanded district.

A beginning has been made with multiplication of seed of two recently evolved superior strains of Gaoari, for distribution in the next year.

2. Aurangabad District—Distribution of Banilla seed was continued, with a view to replace the inferior mixture now grown in the district. 143,040 lb of seed sufficient for about 9,000 acres was distributed by the Agricultural Department on Tatas system.

3. Parbhani District—Distribution of seed of Verum 262 was continued, with the object of replacing the present inferior variety. 18,296 lb of seed sufficient for about 1,550 acres was distributed by the Agricultural Department.

4. Raithur District—Distribution of seed of improved varieties was continued, with a view to replace the local inferior type of Kumpa and the mixed Dharwar-American Seed of Jayawant variety amounting to 295,608 lb sufficient for about 29,551 acres and this year seed of Upland Gadag No. 1 amounting to 31,710 lb for about 3,471 acres was distributed.

APPENDIX VI
BALANCE SHEET AS AT 31ST MARCH 1935

BALANCE SHEET AS AT 31ST MARCH 1935—contd

154

Receipts	Rs a p	Expenditure	Rs a p	Rs a p
Brought forward	113 54 007 4 9	E Staff & Retair b— 1 Studies of village consumptn of cotton 2 Research Improvement Scheme	Brought forward	24 27 756 11 10
			26 005 7 6	
			3 697 0 0	25 902 7 5
II Technological Retair b— 1 Technological Laboratory— A Capital Expenditure— 1 Land and Building 2 Machinery 3 Freight 4 Apparatus and Equipment 5 Machinery Workshop		3 62 741 10 3 36 336 1 8 7 502 2 8 41 58 3 7 6 780 8 5		
			16 10 536 5 3	
			63 397 3 3	20 07 861 3 5
				2 30 822 6 7
III Research Studentships		AcADEMICAL RESEARCH GRANTS		
IV Bursary —				
1 A Surat Physiological		2 46 139 11 3		
2 B Boll worm Writing up		1 14 814 7 8		
2 A Boll worm Propaganda		1 14 609 0 7		
3 C Dharwar Witt Writing up		0 1 486 0 2		
3 A Dharwar Witt		1 82 836 4 11		
4 B Writing up		10 902 10 3		
4 Khandesh Cotton Breeding		19 573 5 6		
5 Co-ordination of Cotton Research		1 749 7 6		
6 Nagpur Cotton Breeding		20 251 5 3		
7 Broach Cotton Breeding		25 066 13 7		
8 Small Lat Disease Survey		4 037 2 0		
9 Survey of Gochard cotton in Bombay Presidency		510 0 0		
10 Distribution of cottonseed in Bombay Presidency		3 450 0 0		
V Madras—				
(a) Herbarium		1 12 097 6 8		
(b) Penicillium		61 671 12 5		
(c) Fodder Cichlid		10 3 5 6 4		
(d) Nardam Cotton Breeding		4 689 6 8		
Carried over				
			9 26 335 7 3	47 96 372 12 4

BALANCE SHEET AS AT 31ST MARCH 1935—concl'd

Particulars	Rs	Rs	Rs	Rs	Rs	Rs	Rs
	Rs	Rs	Rs	Rs	Rs	Rs	Rs
Brought forward	1135607 4 9						
VI Pusah—							
(a) Botanical							
(b) Entomological							
(c) White Fly							
(d) Root Rot							
(e) Spraying Trials							
(f) Deficit of and Deficit Intg.							
(g) Physiological							
(h) Survey of Disease of Malformations							
VII Central Provinces—							
(a) Botanical							
(b) Entomological							
VIII United Provinces—							
(a) Tuber Boll worm							
(b) Rabha and Dandekhand Cotton Survey							
(c) Institute of Plant Industry Indore							
X Sind—							
XI Burma—							
(a) Capital							
(b) Cotton Imprv. etc.							
XII Hyderabad—							
(a) Botanical							
(b) Cotton Survey							
XIII D Barry							
XIV Baroda—							
(a) Root Rot							
(b) Comparative Test ¹²							
(c) Survey of Gopgarhi Cotton							
XV Bengal-Central							
XVI Loans recoverable (out comes direct doubtful) —							
(1) Co-operative Cotton Sale Society, Hoshi							
(2) Co-operative Cotton Sale Society, Gaudag							
Suspense account							
By Balance							
Total	1135607 4 9						
Total	1135607 4 9						

BALANCE SHEET AS AT 31ST MARCH 1935

Provident Fund Account

RECEIPTS	Rs	a	p	Rs	a	p	EXPENDITURE	Rs	a	p	Rs	a	p
Subscribers contributions <i>Less</i> —Payments made to sub- scribers resigned	1 62 585	5	4				By Advances to subscribers <i>Less</i> —Recoveries made upto 31st March 1935	31 911	3	0			
Committee's contributions <i>Less</i> —Payments made to sub- scribers resigned and forfeitures to the Committee and to the Lapses and Forfeitures account	1 59 010	11	7	1 22 375	8	1		27 696	12	0	4 214	7	0
Suspense Deposit of Mr Dutt's own contributions with Interest	38 002	1	8	1 21 008	9	11	Accrued interest on Government Paper credited to subscribers account				2 209	4	0
Suspense Receipts (Provident Fund amount of Mr Ariz Ahmed)	224	7	6				By Balance				2 64 489	10	7
Investment Fluctuation account Lapses and Forfeitures account													Total
Total													270 913 5 7

STATEMENT OF RECEIPTS AND PAYMENTS FOR THE YEAR ENDED 31ST MARCH 1935

RECEIPTS	Rs. a. p	PAYMENTS	Rs. a. p
Opening Balance Receipts under Section 12 of the Indian Cotton Crop Act, 1923	27 40 059 14	Administration of the Committee, Marketing, Seed Distribution and Items on Printing and Propaganda and Statistical Research	4 02 392 12 5
*Other Receipts	7 33 655 14	Agricultural Research Grants in Aid	4 00 700 13 5
Interest on Investments	1 31 912 5	Technological Research	1 08 463 1 0
^t Includes Rs 4 728-7 on account of Sinking Fund and Rs. 15 355-9 against loans recoverable from Hubli and Gadag Cooperative Cotton Sale Societies		Closing Balance (Government at cost) ---	
^t Includes Rs 1 110 31-0 against provision for Sinking Fund for the year 1934-35.		Government Promissory Notes of the face value of Government of India Loan 1947-50 of the face value of Government of India Loan 1948-50 of the face value of Government of India Loan 1955-60 of the face value of Government of India Loan 1959-61 of the face value of Government of India Loan 1961-64 of the face value of Government of India Loan 1964-65 of the face value of Government of India Loan 1965-66 of the face value of Government of India Loan 1966-67 of the face value of Government of India Loan 1967-68 of the face value of Government of India Loan 1968-69 of the face value of Government of India Loan 1969-70 of the face value of Government of India Loan 1970-71 of the face value of Government of India Loan 1971-72 of the face value of Government of India Loan 1972-73 of the face value of Government of India Loan 1973-74 of the face value of Government of India Loan 1974-75 of the face value of Government of India Loan 1975-76 of the face value of Government of India Loan 1976-77 of the face value of Government of India Loan 1977-78 of the face value of Government of India Loan 1978-79 of the face value of Government of India Loan 1979-80 of the face value of Government of India Loan 1980-81 of the face value of Government of India Loan 1981-82 of the face value of Government of India Loan 1982-83 of the face value of Government of India Loan 1983-84 of the face value of Government of India Loan 1984-85 of the face value of Government of India Loan 1985-86 of the face value of Government of India Loan 1986-87 of the face value of Government of India Loan 1987-88 of the face value of Government of India Loan 1988-89 of the face value of Government of India Loan 1989-90 of the face value of Government of India Loan 1990-91 of the face value of Government of India Loan 1991-92 of the face value of Government of India Loan 1992-93 of the face value of Government of India Loan 1993-94 of the face value of Government of India Loan 1994-95 of the face value of Government of India Loan 1995-96 of the face value of Government of India Loan 1996-97 of the face value of Government of India Loan 1997-98 of the face value of Government of India Loan 1998-99 of the face value of Government of India Loan 1999-2000 of the face value of Government of India Loan 2000-01 of the face value of Government of India Loan 2001-02 of the face value of Government of India Loan 2002-03 of the face value of Government of India Loan 2003-04 of the face value of Government of India Loan 2004-05 of the face value of Government of India Loan 2005-06 of the face value of Government of India Loan 2006-07 of the face value of Government of India Loan 2007-08 of the face value of Government of India Loan 2008-09 of the face value of Government of India Loan 2009-10 of the face value of Government of India Loan 2010-11 of the face value of Government of India Loan 2011-12 of the face value of Government of India Loan 2012-13 of the face value of Government of India Loan 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Government of India Loan 2032-33 of the face value of Government of India Loan 2033-34 of the face value of Government of India Loan 2034-35 of the face value of Government of India Loan 2035-36 of the face value of Government of India Loan 2036-37 of the face value of Government of India Loan 2037-38 of the face value of Government of India Loan 2038-39 of the face value of Government of India Loan 2039-40 of the face value of Government of India Loan 2040-41 of the face value of Government of India Loan 2041-42 of the face value of Government of India Loan 2042-43 of the face value of Government of India Loan 2043-44 of the face value of Government of India Loan 2044-45 of the face value of Government of India Loan 2045-46 of the face value of Government of India Loan 2046-47 of the face value of Government of India Loan 2047-48 of the face value of Government of India Loan 2048-49 of the face value of Government of India Loan 2049-50 of the face value of Government of India Loan 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Government of India Loan 2069-70 of the face value of Government of India Loan 2070-71 of the face value of Government of India Loan 2071-72 of the face value of Government of India Loan 2072-73 of the face value of Government of India Loan 2073-74 of the face value of Government of India Loan 2074-75 of the face value of Government of India Loan 2075-76 of the face value of Government of India Loan 2076-77 of the face value of Government of India Loan 2077-78 of the face value of Government of India Loan 2078-79 of the face value of Government of India Loan 2079-80 of the face value of Government of India Loan 2080-81 of the face value of Government of India Loan 2081-82 of the face value of Government of India Loan 2082-83 of the face value of Government of India Loan 2083-84 of the face value of Government of India Loan 2084-85 of the face value of Government of India Loan 2085-86 of the face value of Government of India Loan 2086-87 of the face value of Government of India Loan 2087-88 of the face value of Government of India Loan 2088-89 of the face value of Government of India Loan 2089-90 of the face value of Government of India Loan 2090-91 of the face value of Government of India Loan 2091-92 of the face value of Government of India Loan 2092-93 of the face value of Government of India Loan 2093-94 of the face value of Government of India Loan 2094-95 of the face value of Government of India Loan 2095-96 of the face value of Government of India Loan 2096-97 of the face value of Government of India Loan 2097-98 of the face value of Government of India Loan 2098-99 of the face value of Government of India Loan 2099-2000 of the face value of Government of India Loan 202000-2001 of the face value of Government of India Sterling Bearer Bonds of the face value of 3% India Sterling Bearer Bonds of the face value of	Rs. 7 08 700 2 18 032 13 0 04 245 8 10 01 000 25 000 1 88 611 3 56 500 0 1 41 212 6 4 13 500 4 13 525 2 2 20 000 2 20 080 14 10
Market Value on 31st March 1935 Rs. 31 33 201-5 6)		Rs. a. p	Rs. a. p
Imperial Bank of India Current Account Imprest—Committee's Accounts as certified by the Secretary Technological Laboratory at certified by the Director Technological Laboratory High Commission for India London Fellowship (Rs 100)		26 15 000 4 15 99 10 9	
Deposit with Imperial Bank for 10 Reserve Bank Shares Surrender (Recoverable) Loan Recoverable (that comes due during Total Closng Balance			3 835 10 5 1 635 1 0 1 635 1 0 11 970 12 5 26 52 020 6 3 36 23 645 3 11
Total	36 23 645 3 11		

the Imperial Bank of India for security against any overdraw that may be incurred by the Government of India.

- [REDACTED] - 601-200 Account of Provision for Stocking Fund

Wright remained

Postscript 20th April 1925.

(S) S B Bulimoria & Co
Registered Accountants Auditors

PROVIDENT FUND ACCOUNT AS AT 31ST MARCH 1935

	Rs a P	Rs a P	Rs a P	Rs a P
To Opening Balance as on 1st April 1934	932 051 12 10			
Subscribers' Contributions	37 450 14 0			
Advances against advances	4 318 12 0			
	21 860 10 0			
Less—Returns to Subscribers who have returned Advances to Subscribers	5 800 12 7 8 873 0			
	2 647 61 6 10 12 7 2 12 *			
Committee's Contribution received from Indian Central Cotton Committee at 100 per cent	17 400 14 0			
	2 60 479 8 3			
Less—Payments to Subscribers who have resigned including transfers to Large and Forfeitures Account for contributions disallowed	6 711 25 0			
	8 653 12 3			
Interest received on Advances to Subscribers	180 6			
Interest received on Income Tax deducted on Interest received during 1933-34	105 6 0			
	9 129 9 10			
Less—Interest paid during the year to subscribers who have resigned.—	Rs a P			
On their own contributions	161 14 8			
On Committee's contributions	157 14 5			
Interest paid in advance at the time of purchase of Government Paper (Interest rate 4%)	261 4 2			
Income Tax deducted from Interest on Investments (re convertible)	14 11 7			
Bank's Commission for collection of interest and cost of stamps	23 0 5			
	628 13 7			
Large and Forfeitures Account; Investment Fluctuation Account; Suspense Account of Mr Ahs Ahmed (deceased)	8 489 12 3 533 3 4 1 734 11 0 222 7 0			
Total	2 64 450 10 7			
				2 64 450 10 7

By Balance —
Securities in Government Paper at Market
Price
3½% Government Provisory Notes of the face value of Rs 85 000
3½% Government of India Loan
10½% of the face value of 10/17 50 0
4% Government of India Loan
10½% of the face value of 5% Government of India Loan
1929-41 of the face value of 6½% Bombay Improvement Trust Loan 1937 of the face value of
Saving Bank Deposit with the Imperial Bank of India
Saving Bank Account with the Imperial Bank of India
Current Account with the Imperial Bank of India

*Total Clos of Balance

*Includes Rs 1 008 3 8 be net Suspense Dr
post with interest thereon of Mr. Datta
own contribution.

Unaudited and found correct.

(Sd) S. B. BHALLONIA & CO.
Chartered Accountants, Mumbai

STATEMENT SHOWING EXPENDITURE UNDER RESEARCH AND SEED EXTENSION SCHEMES UP TO MARCH 31st 1935

Major Heads	Total sanctioned grant Rs. a. p.	Period. Yrs. Months	Date of starting of work	Total expenditure up to 31st March 1935	Expenditure from Capital Grants on (a) Lands and buildings			Expenditure from annual grants on apparatus and equipment of a permanent or semi permanent nature			Net working expenses of staff (old paper) and material etc., laboratory and field contain- ing apparatus including furniture	Remarks
					RESEARCH Rs. a. p.	SCHEMES Rs. a. p.	(b) Machinery apparatus and other movable property	RESEARCH Rs. a. p.	SCHEMES Rs. a. p.	RE. a. p.		
1	2	3	4	5	6	7	8	9	10	11		
11 Technological Research—												
(1) Technological Laboratory—												
(a) Capital Expenditure	571 260 3	5										
(b) Working Expenses	15 231 00 15 5	3										
(c) Financial	63 397 3	3										
AGRICULTURAL RESEARCH GRANTS												
IV Research Schemes—												
(1) Sanst. Physiological and Working up	291 446 0	0	10	11	Sept. 1923 Do 1924 July 1924	2 50 954 2 11 1 14 609 9 7 2 315 3 0			22 324 5 2 1 0 87 8 7 2 315 3 0	227 610 15 0 1 0 87 1 0 2 315 3 0		
(2) Sanst. Soil worm (3) Sanst. Cotton (4) Sanst. Cotton Proprietary and Clean	120 20 0	0	7	4								
(5) Sanst. Cotton seed	2 420 0	0	0	0								
(6) Sanst. & Cotton breed ing	1 25 764 0	0	0	0	April 1931	0 1 465 9 2			10 628 0 11	60 640 8 3		
(7) Sanst. & Cotton breed ing	2 63 546 0	0	6	11	Sept. 1923	1 82 836 4 11			13 713 3 7	1 0 0 123 1 4		
(8) Khandesh Cotton breed ing	11 255 0	0	0	10	June 1932	30 002 20 3			10 902 20 3	5 0		
(9) Research Cotton breeding (10) Irrigation Cotton breeding (11) Combination of Cotton research of small Survey of small increase of cotton (12) Survey of Central Cotton Industry (13) Application of Cotton seed in Irrigation dry land Recruiting Non recurring	27 935 0	0	5	6	Oct. 1926 April 1932 Do. Not to start Nov. Jan. 1935	26 573 5 0 25 065 13 7 20 251 5 3 1 745 7 0 6 037 2 0 510 0 0 Net Started			2 058 1 0 751 0 3 10 500 5 3	26 573 5 0 22 408 12 7 1 740 7 0 3 511 15 6 510 0 0 3 450 0 0		

STATEMENT SHOWING EXPENDITURE UNDER RESEARCH AND SEED EXTENSION SCHEMES UP TO MARCH 31ST 1935—contd

Major Heads.	Total sanctioned grant.	Period.	Date of starting of work.	Total expenditure up to 31st March 1935	Expenditure from Capital Grants on			Expenditure from annual grants on apparatus and equipment of a permanent or semi permanent nature.			Net work up to date field experiments labour and field cost a greces including petty apparatus	REMARKS	
					Rs.	a	p	Rs.	a	p			
1	2	3	4	5	6	7	8	9	10	11	12	13	
V	RESEARCH	Yrs Mths			Rs.	a	p	Rs.	a	p	Rs.	a	p
(1) Insects—					147065	0	0	14	8	Dec. 1929	112097	6	6
(2) Fungi and Physiolo-					212770	0	0	7	0	Sept. 1931	61071	12	6
gical											0254	11	10
(3) Pesticides—					900	0	0	6	6	Jan. 1931	10355	5	4
(4) Capital					16800	0	0				881	11	7
(5) Recurring											270	11	11
(6) Medium Cotton Breeding					13750	0	0	5	0	June 1933	4680	0	3
VII	PROJECTS										388	14	0
(1) Insects—					31310	0	0	1					
(2) Capital Expenditure					1050550	0	0	11	8	Aug. 1925	437008	0	7
(3) Entomological											9102	11	0
(4) Capital Expenditure					6000	0	0	10	11	May 1925	156411	13	4
(5) Weaving Expenses											6828	3	10
(6) Weaving					40410	0	0						
(7) Pink and Spotted Fall worms					58087	0	0	4	11	May 1931	23149	5	0
(8) White Fly					42208	0	0	5	0	Sept. 1932	20678	3	9
(9) Root Rot					24400	0	0	2	0	July 1933	10932	12	3
(10) Surveying Trials					148833	0	0	3	0	March 1935	1919	5	0
(11) Pathological											6985	1	0
(12) Delimitation and Delineating Plants—											9245	15	6
(13) Recurring					1000	0	0				9114	6	3
(14) Non-recurring					6700	0	0				3028	6	3
(15) Survey of disease of nail formation					2674	0	0	1	0	June 1934	1911	0	0
VIII	CENTRAL PROVINCES										1911	0	0
(1) Botanical					1461000	0	0	2	6	Oct. 1923	344737	12	6
(2) Entomological					38160	0	0	13	0	April 1934	27220	0	0
					6773	0	0	2	0	July 1934			
											4605	12	10
											340131	15	6
											84	2	0
											2125	14	0

RRA 2000 transferred
to Capital from
Working grant.

RRA 82740 since
reimbursed.
RRA 15050 since
refunded.

The balance of this
amount will be
R.R.A. 100154 left
over.

STATEMENT SHOWING EXPENDITURE UNDER RESEARCH AND SEED EXTENSION SCHIMES UP TO MARCH 31ST 1935—*contd*

Major Heads.	Total sanctioned grant.	Period	Date of starting of work.	Total expenditure up to 31st March 1935	Expenditure from Capital Grants on			Expenditure from annual grants on operational and equipment of permanent or semi-permanent nature			Net working expenses for staff, field experiments, laboratory and field continual service including petty apparatus	Remarks
					(a)	(b)	(c)	(d)	(e)	(f)		
1	2	3	4	5	6	7	8	9	10	11	12	
VII. United Provinces— (1) Plant Diseases Scheme— (a) Capital Expenditure (b) Working Expenses (c) Recurring grant for staff	54,000 0 0 55,000 0 0 44,475 0 0	Yrs 8 7 7	Mths 0 9½ 0	July 1923(a) Oct. 1925(b)	1,07,631 1 4	47,935 12 9	6,665 4 8	90,785 0 4	(a) Scheme closed down on 31st July 1931	(c) Rs 60,202-12-10 transferred from Remaining grant to Capital		
(2) Pithkhard and Bindel Khand Cotton Survey	15,500 0 0	3	0	July 1923	9,732 10 0	1,035 3 1	6,479 6 11	6,479 6 11	(b) Scheme closed down on 12th July 1931			
X. Institute of Plant Industry <i>Indore</i> — (1) Capital Expenditure (2) Working Expenses	(72,63,655 12 10) 10,32,907 15 2	Permanent	0.4.	1924	13,39,343 12 0	{ 2,12,35,921 5	70,933 1 5	31,657 4 4	10,29,920 16 10			
XI. Sind— XII. Bihar— (1) Capital Expenditure (2) Cotton Improvement	27,136 0 0 3,000 0 0 49,032 0 0	9	9	July 1927	1,45,005 0 5	2,906 15 5	39 0 6 6	18,537 5 6	1,00,537 10 11			
XIII. Mysore— (1) Capital Expenditure (2) Cotton Improvement	8,89,617 0 0 39,165 0 0	6	0	April 1931 May 1929 June 1931	2,906 15 5 28,222 7 0 1,58,328 14 4 25,815 10 3	6,403 9 21 149 6 7	1,51,865 5 2 35,000 3 8	21,272 1 0 *Figures subject to revision on receipt of Annual Return for 1934-35				
XIV. Bihar— (1) Capital Expenditure (2) Working Expenses	42,190 0 0 14,500 0 0 35,200 0 0	3	0	June 1933	14,171 15 1	3,735 1 9	3,581 6 9	123,12 11*	14,051 2 2			
XV. Bengal— (1) Plant Protection (2) Comparative trials of 1027 & 1A cotton of (1) Survey of Coir and Cotton	58,279 0 0 4,730 0 0 6,000 0 0	5	0	Jan 1931 Feb. 1932 April 1932 Feb. 1935	81,069 8 9 31,927 15 11 4,251 5 3 505 0 0	2,931 11 6 145 11 6	2,846 0 3 4,105 0 0 505 0 0	10,100 14 3 4,105 0 0 505 0 0				
XVI. Bengal Committee Cotton At Joras (Under Adhikar) Calcutta	18,410 0 0 6,412 0 0	5	0	Not started. Dec. 1934	822 0 0	114 4 0	774 12 0					

I C STATE DISTRIBUTION AND REVIEWS OF SERVICES

No. or Name	Total sanctioned grant	Period.	Date of starting off the Scheme.	Total expenditure up to 31st March 1935.	Expenditure from Capital Grants on			Net working expenses of staff, field experiments, labour and stores laboratory and field centres including Petty apparatus.	Remarks
					(a)	(b)	(c)		
	Rs. a. p.	Rs. a. p.	Rs. a. p.	Rs. a. p.	Rs. a. p.	Rs. a. p.	Rs. a. p.	Rs. a. p.	Rs. a. p.
Portuguese									
(1) Madras	50 110 0 0	5 0	June 1930	3 ^o 415 7 3				22 445 7 3	
{(2) Ceylon	64 513 0 0	6 0	Da	33 076 10 0				83 026 10 0	Scheme closed down on 10th June 1935
{(3) Gaudig Superannuity Fund	21 448 0 0	4 0	June 1931	20 188 10 0				17 259 5 0	Not started
U.S.A.									
(a) Hawaii	27 752 0 0	5 0	April 1932	11 756 0 11				10 784 6 11	Not started
(b) Alaska	44 137 0 0	5 0	April 1932	11 756 0 11				25 215 3 1	Receivables amounting to Rs 10,000 are anticipated from this scheme as per provisional figure.
(c) Philippines	27 625 0 0	5 0	April 1930	35 243 3 1					
(d) Surat	50 040 0 0	0 0							
India									
(1) Khandesh	10 70 340 0 0	6 0	May 1931	1 19 371 12 5				1 09 213 5 6	
(2) Deccan Canals (Baroda)	125 800 0 0	6 0	April 1934	3 605 10 3				3 505 10 3	
(3) R.D & Co.	10 400 0 0	3 0							
Maharashtra									
(1) Tax and Allowances of the Business Manager	41 050 0 0	6 0	May 1931	13 028 15 0				12 887 11 0	
(2) Co. 2	81 310 0 0	6 0	Sept 1932	16 132 12 4				15 018 15 4	
Gujarat									
(1) Ahmedabad	15 860 0 0	(b) 2 0	May 1933	3 052 2 0				3 052 2 0	
(2) Baroda	18 125 0 0	5 0	April 1931	16 028 3 3				12 830 1 7	Scheme closed down on 16th July 1934
Haryana									
(1) Haryana Central Provincial Council	3 ^o 400 0 0	5 0	March 1930	23 054 12 1				23 054 12 1	
Jammu & Kashmir									
(1) Jammu & Kashmir Central Provincial Council	117 000 0 0	3 6	Sept 1930	73 664 2 5				73 544 2 5	Scheme closed down on 30th April 1934
Rajasthan									
(1) Extension of Long staple and Marketing of Urenia Cotton	1 25,029 0 0	3 0	April 1934	30 225 0 0				30 225 0 0	
Madhya Pradesh									
(1) Madhya Pradesh Central Provincial Council	23 600 0 0	6 0	Da	8 117 4 0				2 999 12 0	
Uttar Pradesh									
(1) Uttar Pradesh Central Provincial Council	43 800 0 0	2 0	May 1935						

APPENDIX VII.

INDIAN RAW COTTON CONSUMED IN INDIAN MILLS

(Based on Returns made under the Indian Cotton Cess Act, 1923 by Mills in British India and on Voluntary Returns from or Yarn Production figures of Mills in Indian States)

Cotton Year 1st September to 31st August

(In Bales of 400 lb Nett)

	1923-24	1924-25	1925-26	1926-27	1927-28	1928-29	1929-30	1930-31	1931-32	1932-33	1933-34	1934-35
Doubtful Island												
Bombay	702,610	687,556	731,937	747,039	435,426	544,035	706,375	664,516	611,006	605,034	491,709	647,237
Ahmedabad	262,745	273,639	246,800	261,139	298,073	318,633	311,021	321,503	322,557	318,009	373,813	320,529
Bombay Presidency	1,190,410	1,424,447	1,189,630	1,187,802	634,671	1,044,025	1,300,859	1,172,639	1,132,646	1,116,227	1,063,649	1,239,616
Madras	149,721	162,876	170,274	185,207	191,501	204,284	211,488	211,759	200,747	209,013	216,050	312,164
United Provinces	160,622	177,064	191,740	201,702	170,816	182,462	234,703	235,023	456,870	273,573	277,230	292,424
Central Provinces and Berar	61,635	106,632	109,693	111,592	116,888	121,391	123,146	118,402	113,018	111,708	112,650	125,014
Baroda	72,535	63,653	77,919	89,763	62,685	64,212	90,075	91,003	102,299	103,784	107,653	101,101
Punjab and Delhi	23,358	30,665	35,394	40,687	45,633	54,575	64,454	72,735	89,851	80,654	71,039	85,697
Rest of British India	32,227	34,414	37,313	13,010	22,169	24,456	27,101	30,342	31,935	35,159	33,575	
Total-British India	1,003,435	1,590,069	1,798,204	1,612,723	1,019,709	1,714,035	2,057,625	1,935,383	1,987,005	2,009,664	1,946,219	2,163,791
Total-Indian States	147,503	175,603	167,614	229,443	251,559	277,510	315,393	333,906	358,703	351,200	330,116	425,341
Total-India	1,655,913	2,171,876	1,985,613	2,042,176	1,771,219	1,954,576	2,373,091	2,269,359	2,316,356	2,360,924	2,336,326	2,612,132

INDIAN RAW COTTON CONSUM'D IN MILLS IN INDIAN STATES

(Based on Voluntary Returns from or 1 am Production figures of Mills in Ind in States)

Cotton Year 1st September to 31st August

(In Rales of 400 lbs Nett)

	1929-30	1927-28	1929-30	1929-30	1929-30	1929-30	1929-30	1929-30	1929-30
Gujerat	16,219	16,027	16,067	" 675	23,074	31,790	33,453	33,731	45,583
Madras	43,571	44,370	50,619	46,550	45,376	40,703	56,506	47,168	61,106
Punjab	46,070	46,834	43,832	50,013	0*578	64,581	50,597	63,012	57,146
Gwalior	21,237	25,776	30,708	41,403	45,207	45,692	43,938	40,382	56,318
Indore	53,670	65,391	76,070	83,076	89,870	95,296	91,036	111,450	114,229
Kathiawar State Other Indian States Puducherry	49,808	42,981	67,704	64,454	{ 20,213 38,638 18,350	18,610 39,346 20,237	18,986 40,200 23,810	26,506 45,107 22,801	25,453 46,743 5,635
Total	\$79,615	251,569	277,510	315,390	315,906	3,3793	551,250	520,116	628,311

LOOSE (UNPRESSED) INDIAN RAW COTTON RECEIVED IN SPINNING MILLS IN BRITISH INDIA

(Based on Voluntary Returns furnished by Mills)

Cotton Year 1st September to 31st August

(In Rales of 400 lbs Nett)

	1929-30	1927-28	1929-30	1929-30	1929-30	1929-30	1929-30	1929-30	1929-30
Bombay	25,975	24,970	27,374	21,361	0 1469	74,979	80,002	74,863	58,355
Madras	33,105	32,560	52,188	46,532	63,713	90,353	90,316	110,675	123,200
United Provinces	16,991	16,208	13,978	20,461	18,406	14,367	19,236	17,971	10,090
Central Provinces and Berar	40,702	30,931	6,924	16,213	15,771	26,743	17,462	16,382	20,644
Punjab	3,910	4,739	3,700	4,301	4,307	2,317	2,149		5,635
Total	122,159	100,458	108,074	111,956	140,700	211,705	215,279	201,906	217,784

APPENDIX VIII.

**STOCKS OF INDIAN RAW COTTON HELD IN INDIA BY THE MILLS
AND THE TRADE ON 31st AUGUST, 1934 & 1935.**
 (In thousand bales* of 400 lb each)

Trade Descriptions of Cotton	TRADE STOCKS ON 31st AUGUST								MILL STOCKS ON 31st AUGUST		TOTAL INDIAN TRADE AND MILL STOCKS ON 31st AUG		
	BOMBAY ISLAND		KARACHI		REST OF INDIA		TOTAL INDIA		TOTAL INDIA		1934 1935		
	1934	1935	1934	1935	1934	1935	1934	1935	1934	1935	1934	1935	
BENGALS—													
United Provinces	—	—	—	—	(a) 16	(a) 9	18	0	30	23	35	32	
Punjab	—	—	64	27	(b) 8	(b) 4	72	31	10	8	82	89	
Sind	—	—	51	14	—	—	51	14	4	3	55	17	
Rajputana	—	—	3	1	—	(c) 1	3	2	17	15	20	17	
Others (Unclassified)	00	65	—	—	(c) 1	00	66	3	3	3	93	60	
Total	00	65	118	42	24	15	232	122	54	52	286	174	
ORISSA—													
Central Provinces Orissa	21	19	—	—	(d) 1	(d) 15	22	24	27	32	43	56	
Berar Orissa	60	24	—	—	(c) 15	(c) 14	75	68	18	11	91	49	
Khandesh—Banilla	—	—	—	—	—	—	—	—	6	13	6	13	
Khandesh Orissa	45	19	—	—	—	(f) 4	45	23	16	15	61	83	
Central India—Malvi	34	14	—	—	(c) 7	(c) 4	43	18	12	10	55	28	
Central India—Others	26	14	—	—	(c) 1	(c) 4	27	18	7	11	34	29	
Total	188	90	—	—	24	31	212	121	106	110	316	231	
VRASAM 262													
HYDERABAD GAORANT	—	—	—	—	—	—	—	—	10	6	10	6	
Total	1	—	—	—	—	—	—	—	67	52	95	62	
AMERICANS—													
Punjab—289 F	—	—	—	—	—	—	—	—	10	6	10	6	
Punjab (Unspecified—4 F)	7	13	34	39	(b) 6	(b) 23	47	75	60	44	107	119	
Sind—289 F	—	—	—	—	—	—	—	—	5	10	7	17	
Sind (Unspecified—4 F)	2	17	6	4	—	—	—	—	21	19	21	40	
Dharwar (Gadag 1)	—	—	—	—	—	—	—	—	3	6	3	6	
Dharwar (Upland—Unspecified)	—	—	—	—	—	—	—	—	3	1	3	1	
Cambodia (Countrabore No 2)	—	—	—	—	—	—	—	—	55	61	55	61	
Cambodia (Unspecified)	20	9	—	—	—	—	—	—	33	35	56	44	
Total	29	39	42	50	6	23	77	112	182	182	250	294	
BROACH—													
Surat Navsari (Surti)	6	8	—	—	(c) 4	(c) 6	6	6	58	26	62	34	
Broach (Unspecified)	76	22	—	—	—	—	80	23	49	80	129	55	
Total	82	30	—	—	4	6	85	38	103	68	191	92	
DUOTELIXAS—													
Mattheo	28	16	—	—	—	—	28	18	2	6	30	23	
Cutch	—	—	—	—	—	—	—	—	1	2	1	2	
Wagad	—	—	—	—	(c) 6	(c) 7	54	34	43	32	42	32	
Dholeras (Unspecified)	44	27	—	—	—	—	—	—	10	10	64	44	
Total	74	45	—	—	8	7	62	62	65	49	137	101	
SOUTHERNS—													
Kumptas (Jayawant)	—	—	—	—	—	—	—	—	19	20	19	20	
Kumptas (Unspecified)	—	—	—	—	—	—	—	—	64	31	64	51	
Westerns (Jowari and Mungari)	56	22	—	—	—	—	{(d) 9 } 56	34 { (d) 29 }	19	42	125	104	
Northerns	—	—	—	—	—	—	{(d) 5 }	—	3	8	2	19	
Cocanadas (& Warangal)	—	—	—	—	—	—	{(d) 14 }	—	14	3	20	15	
Karunaganti	—	—	—	—	—	—	—	—	15	20	24	30	
Tinnelvelles	—	—	—	—	—	—	—	—	3	30	33	30	
Salem	—	—	—	—	—	—	—	—	3	2	2	2	
Unclassified	33	14	—	—	—	—	33	14	—	—	33	14	
Total	92	42	—	—	—	—	26	62	63	203	192	233	200
CORNILLAS													
BURSAS (Wagale & Wagyl)	—	—	—	—	—	—	—	—	—	—	3	2	
Other Soats (Unclassified)	6	10	1	—	1	—	3	10	4	1	12	10	
Total Indian Cotton	582	362	181	92	94	113	817	832	442	700	1,806	1,222	

* Standard Indian bales of approximate average gross weight 400 lb., and net weight 292 lb. of cleaned (lint) cotton.

N.B.—Detailed Statement of Mill stocks on the 31st August 1935, is attached.

- (a) At Cawnpore
- (b) In the Punjab
- (c) At Ahmedabad
- (d) In the Central Provinces.
- (e) In Bihar
- (f) In E. & W. Khandesh districts.
- (g) In Indore and Gwalior States.
- (h) In Hyderabad State.
- (i) Includes 5,021 bales held at Ahmedabad.
- (j) In the Madras Presidency.

STOCKS OF RAW COTTON HELD BY THE

(Compiled from Voluntary

(In thousand bales*)

Trade Descriptions of Cotton.	Bombay Island	Ahmed abad	Rest of Bombay Pres. deney	Total Bombay Presidency	Madras North	Madras South	Total Madras Presidency	United Provinces	Central Provinces,	Bihar	Total C. P. & Bihar	Bengal
BENGALS—												
United Provinces	152	12	12	12	12	12	12	10	1	1	1	1
Punjab	1	1	1	1	1	1	1	1	1	1	1	1
Sind	1	1	1	1	1	1	1	1	1	1	1	1
Rajputana	1	1	1	1	1	1	1	1	1	1	1	1
Others	1	1	1	1	1	1	1	1	1	1	1	1
Total	11	—	—	1	12	12	12	11	1	1	1	1
GOMERAS—												
Central Provinces Gomeras	12	4	12	4	5	5	5	12	12	12	12	12
Bihar Gomeras	1	1	1	1	1	1	1	1	1	1	1	1
Khandesh—Bawali	1	1	1	1	1	1	1	1	1	1	1	1
Khandesh Gomeras	1	1	1	1	1	1	1	1	1	1	1	1
Central India—Malvi	1	1	1	1	1	1	1	1	1	1	1	1
Central India—Others	1	1	1	1	1	1	1	1	1	1	1	1
Barsi and Nagar Gomeras	1	1	1	1	1	1	1	1	1	1	1	1
Total	16	4	26	46	—	1	1	6	25	5	30	—
VERUM 262												
HYDERABAD GAGARAN	1	7	10	1	1	1	1	9	1	10	4	—
Total	8	—	19	27	6	—	6	—	3	14	—	—
AMER CARS—												
Punjab—232 F	6	6	1	1	5	5	5	12	12	12	12	12
Punjab (Unspecified—4 F)	6	6	1	1	6	6	6	12	12	12	12	12
Sind—69 F	8	8	1	1	8	8	8	12	12	12	12	12
Sind (Unspecified—4 F)	8	8	1	1	9	9	9	12	12	12	12	12
Dharwar (Gadap 1)	—	—	1	1	—	—	—	1	1	1	1	1
Dharwar (Upland—Un specified)	—	—	1	1	1	1	1	—	—	—	—	—
Cambodia (Cumbatore No. 3)	6	6	1	1	8	8	8	11	11	11	11	11
Cambodia (Unspecified)	16	16	1	1	17	17	17	45	45	45	45	45
Total	47	3	4	64	4	27	21	—	1*	3	14	—
BROACH—												
Surat Navsari (Surti)	7	10	1	16	—	—	—	1	1	1	2	8
Broach (Unspecified)	12	13	2	26	—	1	1	—	—	—	1	1
Total	19	22	3	46	—	1	1	—	—	—	1	1
DHOOLKARAS—												
Matiello	4	4	1	4	—	—	—	—	—	—	—	—
Cutch	8	8	1	8	—	—	—	—	—	—	—	—
Wared	3	3	1	3	—	—	—	—	—	—	—	—
Dholkeras (Unspecified)	7	7	1	10	25	10	10	—	—	—	—	—
Total	14	25	1	41	—	—	—	—	—	—	—	—
SOUTHERNS—												
Kumptas (Jaywant)	10	1	3	11	8	8	8	—	—	—	—	—
Kumptas (Unspecified)	19	1	10	27	8	8	8	—	—	—	—	—
Westerns (Jowari and Mangar)	18	3	8	20	7	1	1	—	—	—	—	—
Northern	1	3	1	8	2	1	1	31	31	31	31	31
Cocanadas (& Warangal)	1	1	1	1	1	1	1	—	—	—	—	—
Karunaganti	2	1	1	4	14	14	14	—	—	—	—	—
Tinnevelles	3	1	1	4	20	20	20	—	—	—	—	—
Salem	1	1	1	1	1	1	1	—	—	—	—	—
Total	45	9	20	74	41	36	37	—	1	—	1	8
COWILAS												
Uttawas (Wagalo & Wagyo)	—	—	—	—	—	—	—	—	—	—	—	—
Other Souts	—	—	—	—	—	—	—	—	—	—	—	—
Total Indian Cotton	160	64	74	295	81	118	187	82	41	9	40	18
AMERICANS												
Egyptians	24	2	—	30	—	—	—	—	—	—	—	—
East Africans	9	9	1	18	1	—	—	—	—	—	—	—
Others (Dodes, Monopots, etc.)	18	21	8	44	1	—	—	1	1	—	—	8
Total Foreign Cotton	60	81	7	101	1	—	—	1	1	—	—	8
Grand Total	220	95	81	379	82	118	189	40	41	9	49	22

* Standard Indian bales of approximate average gross weight 400 lb.

MILLS IN INDIA ON 31st AUGUST, 1935.

Returns furnished by Mills
of 400 lb each)

Punjab and Delhi	Rest of British India	Total British India	Sylhet abroad	Mysore	Bareilly	Gwalior	Indore	Hathibawar States	Other Indian States	Pondi cherry	Total Indian States	Grand Total	Trade Descriptions of Cotton.
5	11	50	—	—	—	—	—	—	—	—	5	52	BENGALS—
11	11	23	—	—	—	—	—	—	—	—	2	52	United Provinces Punjab Sind Rajputana Others
6	13	47	—	—	—	—	3	1	—	—	5	52	Total
—	—	31	—	—	—	—	—	—	—	—	1	32	OOMRAS—
—	—	11	—	—	—	—	—	—	—	—	—	11	Central Provinces Oomras
—	—	13	—	—	—	—	—	—	—	—	—	13	Bihar Oomras
—	—	15	—	—	—	—	—	—	—	—	—	15	Khammiesh—Bamila
—	—	6	—	—	—	—	—	—	—	—	—	6	Khandesh Oomras
—	—	6	—	—	—	—	—	—	—	—	—	6	Central India—Malvi
—	—	5	6	—	—	—	—	—	—	—	—	6	Central India—Others
—	—	67	6	—	—	1	3	10	—	—	23	110	Total
—	—	5	9	—	—	—	—	—	—	—	1	6	VERSUM 262
—	—	42	9	—	—	—	—	—	—	—	10	HyDERABAD GAORAN	
—	—	47	9	—	—	—	—	—	—	—	11	58	Total
—	—	—	—	—	—	—	—	—	—	—	—	—	AMERICANS—
—	—	—	—	—	—	—	—	—	—	—	—	6	Punjab—240 F
—	—	—	—	—	—	—	—	—	—	—	—	41	Punjab (Unspecified 41)
—	—	—	—	—	—	—	—	—	—	—	—	10	Sund—280 F
—	—	—	—	—	—	—	—	—	—	—	—	19	Sund (Unspecified 41)
—	—	—	—	—	—	—	—	—	—	—	—	6	Dharwar (Unspecif 1)
—	—	—	—	—	—	—	—	—	—	—	—	1	Dbarwar (Unspecif 1)
—	—	—	—	—	—	—	—	—	—	—	—	—	Cambodia (Cochin 1)
—	—	—	—	—	—	—	—	—	—	—	—	61	Cambodia (Cochin No 4)
—	—	—	—	—	—	—	—	—	—	—	—	35	Cambodia (Unspecified 1)
—	—	—	—	—	—	—	—	—	—	—	—	182	Total
—	—	19	11	—	—	—	—	—	—	—	7	26	BANGLA—
—	—	25	—	—	—	—	—	—	—	—	—	30	Khulna (Unspecified 1)
—	—	47	—	—	—	2	1	—	—	—	—	56	Total
—	—	—	—	—	—	—	—	—	—	—	—	—	THE MYSORE R.
—	—	4	—	—	—	—	—	—	—	—	—	6	Mysore
—	—	2	—	—	—	—	—	—	—	—	—	2	Coorg
—	—	25	—	—	—	—	—	—	—	—	—	10	Verapoly
—	—	10	—	—	—	—	—	—	—	—	—	—	Verapoly (Unspecified 1)
—	—	41	—	—	—	—	—	—	—	—	—	42	Total
—	—	19	—	—	—	—	—	—	—	—	—	20	INDIA—
—	—	36	—	—	—	—	—	—	—	—	—	81	Punjab (Unspecified 1)
—	—	28	—	—	—	—	—	—	—	—	—	16	Punjab (Unspecified 1)
—	—	24	—	—	—	—	—	—	—	—	—	23	Punjab (Unspecified 1)
—	—	5	1	—	—	—	—	—	—	—	—	4	Punjab (Unspecified 1)
—	—	19	—	—	—	—	—	—	—	—	—	22	Punjab (Unspecified 1)
—	—	24	—	—	—	—	—	—	—	—	—	22	Punjab (Unspecified 1)
—	—	2	—	—	—	—	—	—	—	—	—	2	Punjab (Unspecified 1)
—	—	155	29	1	—	—	—	—	—	—	37	172	Total
—	—	1	—	—	—	—	—	—	—	—	—	—	—
—	—	1	—	—	—	—	—	—	—	—	—	—	—
—	—	16	593	17	51	6	8	14	9	6	9	102	—
—	—	30	—	—	—	—	—	—	—	—	—	31	—
—	—	20	—	—	—	—	—	—	—	—	—	4	—
—	—	47	—	—	—	—	—	—	—	—	—	47	—
—	—	10	—	—	—	—	—	—	—	—	—	11	—
—	—	107	—	4	7	—	—	—	—	—	2	11	—
—	—	16	703	17	25	13	2	14	10	8	10	111	—

and net weight 392 lb. of cleaned (that) cotton.

STOCKS OF SALFMS 'CAMBODIAS AND TINNEVELLIES HELD IN THE
MADRAS PRESIDENCY, BY THE MILLS AND THE TRADE
ON 31st JANUARY 1935

(In thousand bales of 400 lb. nett)

Trade descriptions of cotton	Mill stocks	Trade stocks.	Total stocks.
Tinnevellies	21	7	28
Salems	10	2	12
Cambodias	42	11	53
Total	73	20	93

APPENDIX IX.

EXPORTS BY SEA OF INDIAN RAW COTTON CLASSIFIED BY VARIETIES

(Compiled from Voluntary Returns furnished by Exporters)

1st September 1934 to 31st August 1935

(In thousand bales* of 400 lb each)

Trade Descriptions of Cotton	Exported to				
	Europe (excluding United Kingdom) and the West	United Kingdom	Japan	China and the East (excluding Japan)	Total Exports
EXCELSA—					
United Provinces	3	1	10	2	27
Punjab	154	42	230	42	405
Sind	159	33	42	—	206
Rajputana	11	9	4	—	10
Others (Unclassified)	50	31	24	—	105
Total	379	110	310	47	855
CORNERS—					
Central Provinces—Oomras	23	21	82	—	141
Berar—Oomras	30	7	224	5	260
Khandesh—Bambla	—	—	2	—	2
Khandesh—Oomras	40	9	172	20	233
Central India—Malvi	10	—	1	—	11
Central India—Others	6	1	41	10	60
Barsi and Nagar—Oomras	6	3	52	5	61
Unclassified	23	10	97	—	130
Total	157	45	681	43	926
VERUM 202	—	—	—	—	—
HYDERABAD GAORANI	1	—	1	—	2
Total	1	—	1	—	2
AMERICAS—					
Punjab—230 P	3	4	—	—	7
Punjab (Unspecified—4 F)	143	126	219	7	495
Sind—249 F	—	1	—	—	1
Sind (Unspecified—4 F)	13	15	14	—	45
Dharwar (Gadag 1)	—	—	3	—	3
Laturwar (Upland—Unspecified)	—	1	2	—	3
Cambodia (Cochinbarate No 2)	2	1	—	—	4
Cambodia (Unspecified)	4	4	8	—	16
Total	166	152	246	10	571
DAKACH—					
Surat Navsari (Soft)	3	—	1	—	4
Breash (Unspecified)	46	5	16	—	67
Total	49	5	17	—	71
DHOLLERAS—					
Mattheo	34	2	50	3	89
Cutch	—	—	4	—	4
Waged	2	1	2	—	4
DHOLLERAS (Unspecified)	3	1	27	—	30
Total	39	2	83	3	127
SOUTHERNS—					
Kumpias (Jayawant)	—	—	—	—	—
Kumpias (Unspecified)	—	—	—	—	—
Westerns (Jowari and Mungui)	7	1	10	1	19
Northerns	22	—	—	—	24
Cocanadas (and Warangal)	8	9	—	—	17
Karunganni	10	—	6	—	16
Tinnevellyies	19	2	27	2	49
Salems	1	—	—	—	1
Total	56	13	43	3	115
COULIAS					
Burmans (Magale and Wagyl)	29	7	12	1	49
Others Sorts	3	—	4	—	7
Grand Total	32	2	102	6	122
Total exports as per official returns from British Indian and Kathiawar Ports—Bales of 400 lb net	991	230	1,505	123	2,515

standard Indian bales of approximate average gross weight 400 lb, and net weight 327 lb. of cleaned (Sax) cotton.

STOCKS OF 'SALEMS' 'CAMBODIAS' AND 'TINNEVELLIES' HELD IN THE
 MADRAS PRESIDENCY, BY THE MILLS AND THE TRADE
 ON 31st JANUARY 1935

(In thousand bales of 400 lb nett.)

Trade descriptions of cotton	Mill stocks	Trade stocks	Total stocks
Tinnevellies	21	7	28
Salems	10	2	12
Cambodias	42	11	53
Total	73	20	93

APPENDIX IX.

EXPORTS BY SEA OF INDIAN RAW COTTON CLASSIFIED BY VARIETIES

(Compiled from Voluntary Returns furnished by Exporters)

1st September 1934 to 31st August 1935

(In thousand bales* of 400 lb. ea.)

Trade Descriptions of Cotton.	Exported to				
	Europe (excluding United Kingdom) and the West	United Kingdom	Japan	China and the Far East (including Japan)	Total Exports
BENGAL—					
United Provinces	2	1	18	2	23
Punjab	184	42	230	42	459
Sind	122	33	42	8	163
Rajputana	11	8	4	1	19
Others (Unspecified)	50	21	24	—	95
	Total	279	110	339	67
GUJARAT—					
Central Provinces—Omoras	23	21	42	—	66
Berar—Omoras	30	7	244	—	241
Khandesh—Bantia	—	—	—	6	6
Khandesh—Omoras	40	8	372	—	420
Central India—Malvi	10	—	3	27	34
Central India—Others	8	1	41	—	49
Barsi and Nagar—Omoras	23	10	62	—	95
Unclassified			37	—	37
	Total	157	45	61	62
VIRUM 262		—	—	—	—
HYDERABAD GAOANI		—	—	—	—
	Total	1	—	1	—
AMRAVATI—					
Punjab—280 F	2	4	—	—	—
Punjab (Unspecified—4 F)	143	120	29	—	272
Sind—249 F	—	—	—	—	—
Sind (Unspecified—4 F)	13	16	34	—	63
Dharwar (Gadak 1)	—	—	—	—	—
Dharwar (Up and—Unspecified)	3	—	—	—	3
Cambodia (Combatoro No 3)	4	4	—	—	4
Cambodia (Unspecified)			—	—	—
	Total	160	151	26	26
BROACH—					
Surat Navsari (Surti)	5	—	—	—	—
Broach (Unspecified)	46	—	3	—	49
	Total	51	—	3	54
DHONDEERAS—					
Mattheo	—	2	—	—	—
Catch	3	—	56	—	59
Wagad	6	—	6	—	6
DHONDEERAS (Unspecified)			—	—	—
	Total	39	—	62	62
SOUTHERNS—					
Kumptas (Jayawant)	—	—	—	—	—
Kumptas (Unspecified)	1	—	—	—	1
Ves eris (Jowari and Munguri)	12	1	—	—	13
Her berries	6	—	—	—	6
Cocanadas (and Warangal)	10	—	—	—	10
Karunganni	16	—	—	—	16
Tinnevelly	1	—	—	—	1
Salems			—	—	—
	Total	54	—	56	56
CODLLAS					
Burmias (Wagale and Wagyl)	29	—	—	—	29
Other Sorts	6	—	—	—	6
	Total	35	—	—	35
	Grand Total	891	—	891	891
Total exports as per official returns from British Indian and Kathiawar Ports—Bales of 400 lb. net	891	—	891	—	891

* Standard

APPENDIX

RECEIPTS AT MILLS IN INDIA OF
(Compiled from Returns
1st September 1931 to
(In thousand bales*)

Trade Descriptions of Cotton	Bombay Island	Ahmednagar	Rest of Bombay Pres. disty.	Bombay Presidency	Madras Pres. disty.	United Provinces	C. P. & Berar	Bengal	Punjab and Delhi	Rest of British India
BENGALS—										
United Provinces	12	—	—	12	—	52	2	12	18	—
Punjab	18	1	3	21	—	5	1	8	24	5
Snd	9	—	—	12	—	—	—	1	—	3
Rajputana	20	—	—	20	7	11	—	1	—	15
Others	5	—	—	—	1	—	—	—	—	—
Total	64	1	7	72	1	69	3	17	42	24
OMRAS—										
Central Provinces Omras	23	1	2	26	2	16	37	20	—	—
Berar Omras	15	—	—	15	—	6	9	4	—	—
Khandesh—Banilla	3	1	13	17	—	—	1	—	—	—
Khandesh—Omras	17	—	26	41	—	—	9	—	—	—
Central India—Malvi	9	12	—	23	—	6	—	—	—	—
Central India—Others	23	2	6	30	—	21	1	—	—	—
Barsi and Nagar Omras	4	—	13	17	—	—	1	—	—	—
Total	91	17	61	172	2	43	57	24	—	—
VERON 202	3	—	—	4	—	—	15	—	—	—
HYDERABAD GAORANI	19	—	46	59	2	—	20	1	—	—
Total	22	1	46	63	2	—	33	1	—	—
AMERICANS—										
Punjab—80 F	12	—	—	12	1	8	—	—	—	—
Punjab (Unspecified—4 F)	18	—	1	19	17	51	—	—	—	—
Snd—28 F	18	—	2	22	—	—	15	—	—	—
Sind (Unspecified—4 F)	16	—	1	19	24	—	1	—	—	—
Dharwar (Gadara 1)	11	—	11	23	—	—	—	—	—	—
Dharwar (Upland—Unspecified)	4	—	5	7	—	—	—	—	—	—
Cambodia (Coimbatore No 2)	14	—	1	18	88	—	—	—	—	—
Cambodia (Unspecified)	47	—	—	49	29	1	—	—	—	—
Total	140	16	19	169	159	69	1	37	29	4
BROACH—										
Surat Navari (Surti)	22	43	4	79	—	—	—	—	—	—
Brocach (Unspecified)	83	36	2	121	1	—	—	—	—	—
Total	115	79	6	200	1	—	2	—	—	3
DHOLLERAS—										
Mattheo	18	2	—	20	—	—	—	—	—	—
Cutch	4	—	—	11	—	—	—	—	—	—
Vagad	12	95	—	109	—	—	—	—	—	—
Dholleras (Unspecified)	23	12	1	36	—	—	—	—	—	—
Total	57	114	6	176	—	—	—	—	—	—
SOUTHERNS—										
Kumptas (Jayawant)	25	2	6	35	3	—	—	—	—	—
Kumptas (Unspecified)	58	22	25	45	3	—	—	—	—	—
Westerns (Jowari and Mungari)	57	13	25	95	14	5	—	—	—	—
Northerns	3	6	—	9	29	—	—	—	—	—
Cocanadas (& Warangal)	22	3	1	6	4	—	—	—	—	—
Kurunamai	3	3	1	7	30	—	—	—	—	—
Tinnevelly	5	3	1	7	25	—	—	—	—	—
Salems	4	1	—	5	7	—	—	—	—	—
Total	160	31	58	249	117	6	1	15	—	—
COTILLAS	—	—	—	—	—	—	—	—	—	—
BURMAS (Wagale & Waeyi)	—	—	—	—	—	—	—	2	—	—
OTHER SORTS	—	—	—	—	3	—	—	—	—	—
Total Ind. Cotton	652	253	196	1191	285	187	97	98	71	44
AMERICANS	45	12	1	61	1	—	—	1	—	—
EGYPTIANS	62	40	3	105	2	—	—	3	—	—
EAST AFR CAND	60	96	11	162	1	1	1	10	—	—
Others (Sudan Mesopotamia etc.)	23	5	2	36	—	—	—	1	—	—
Total Foreign Cotton	193	155	17	385	4	1	1	15	4	—
Grand Total	845	408	213	1466	289	188	98	113	75	44
Indian raw cotton consumed in Indian mills (figures compiled mainly from returns under the Indian Cotton Cess Act—bales of 400 lb net)	637	327	217	1231	312	202	125	101	84	39

* Standard Indian bales of approximate average

X.

RAW COTTON CLASSIFIED BY VARIETIES

furnished by Mills)

31st August 1935.

of 400 lb each).

Total British India	Hyderabad	Mysore	Bardoli	Gwalior	Indore	Kashmir States	Other Ind. & States	Tonel Cotton	Total Indian States	Grand Total	Trade Descriptions of Cotton.
95	—	—	—	—	12	—	—	1	—	109	BENGALS—
59	—	—	—	—	—	—	—	—	—	59	United Provinces
16	—	—	—	—	—	—	—	—	—	16	Punjab
36	—	—	1	2	2	8	—	8	—	64	Sind
20	—	—	—	—	—	—	—	—	—	20	Rajputana
227	—	1	2	14	5	—	9	—	31	258	Others
95	1	—	—	—	—	—	—	—	—	100	Total
31	—	—	—	—	—	—	—	—	—	31	OMRAS—
18	—	—	—	—	—	—	—	—	—	20	Central Provinces OMRAs
53	—	—	—	—	—	—	—	—	—	65	Bihar OMRAs
29	—	—	—	—	—	—	—	—	—	106	Khandesh—Bawali
51	—	—	—	—	—	—	—	—	—	88	Khandesh OMRAs
18	9	—	—	—	—	—	—	1	—	28	Central India—Malvi
298	10	—	5	24	77	—	16	1	133	431	Central India—Others
18	—	—	1	—	1	—	—	1	—	21	Bartsi and Nagar OMRAs
61	31	—	—	—	—	—	1	—	33	114	Total
99	31	—	—	1	—	2	—	1	1	36	VERUM 262
28	—	—	—	—	1	—	—	—	—	30	HYDERABAD GACRANT
134	—	—	—	—	—	—	—	—	—	139	Total
23	—	—	—	—	10	4	1	—	—	25	AMERICANS—
55	—	—	—	—	—	—	—	—	—	67	Punjab—289 F
23	—	—	—	1	—	—	—	—	—	24	Punjab (Unspecified—4 F)
8	—	—	—	—	—	—	—	—	—	8	Sind—289 F
113	—	—	1	—	—	—	—	—	—	120	Sind (Unspecified—4 F)
54	—	—	2	—	—	—	—	—	—	88	Dharwar (Gadag 1)
468	—	9	1	11	1	1	9	7	33	461	Dharwar (Upland—Unspecified)
83	—	—	4	1	11	5	1	1	23	106	Cambodia (Colombatore No 2)
126	—	—	5	—	—	1	1	3	10	136	Cambodia (Unspecified)
200	—	—	9	1	11	6	2	4	33	242	Total
20	—	—	—	—	—	—	2	—	—	22	BROACH—
11	—	—	—	—	—	—	—	—	—	11	Surat Navasari (Surti)
109	—	—	—	10	—	—	18	2	—	139	BROACH (Unspecified)
86	—	—	2	—	—	—	—	—	—	33	Total
176	—	—	12	—	—	20	2	—	34	210	DHOLLERAS—
40	—	—	12	1	—	—	—	—	—	53	Mattoor
90	—	—	11	1	—	—	—	—	—	105	Cutch
123	3	—	11	1	—	—	1	—	—	141	Warad
30	—	—	2	1	—	—	—	—	—	34	Dholleras (Unspecified)
11	—	—	—	—	—	—	—	—	—	18	Total
39	—	—	—	—	—	—	—	—	—	40	SOUTHERNS—
46	—	—	—	—	—	—	—	—	—	55	Kumpitas (Jayawant)
12	—	—	—	—	—	—	—	—	—	27	Kumpitas (Unspecified)
383	6	45	3	—	—	1	4	6	70	458	Westerns (Jowari and Munjari)
15	—	—	—	—	—	—	—	—	—	4	Notherns
3	—	—	—	—	—	—	1	—	1	34	Cocanadas (& Warangal)
1883	49	62	33	50	96	23	66	19	271	454	Karungannai
63	—	—	—	—	—	—	—	—	—	15	Thonvelles
111	—	—	6	6	—	—	—	—	—	123	Salcon
185	—	—	—	22	1	4	—	—	—	215	Total
31	—	—	1	—	—	—	1	—	—	33	COOTILLAS
390	—	—	6	29	—	1	4	1	1	42	BURMAS (Magale & Wagy)
2273	49	68	62	50	97	32	45	20	413	OTHERS	
2,151	46	51	57	56	114	35	46	23	423	Total Indian Cotton	
											AMERICAN
											EGYPTIANS
											EAST AFRICANS
											OTHERS (Sudan, Mesopotamia, etc.)
											Total Foreign Cotton
											Grand Total

Indian raw cotton consumed in Indian mills. (Figures compiled mainly from returns under the Indian Cotton Crop Act—Base of 400 lb. net.)

APPENDIX XI

LIST OF SCIENTIFIC AND TECHNICAL OFFICERS PAID FROM THE INDIAN CENTRAL COTTON COMMITTEE'S FUNDS
AS ON AUGUST 31st 1935

INDIAN CENTRAL COTTON COMMITTEE OFFICE

1 Secretary	2 Deputy Secretary	3 Publicity Officer	4 Director	5 Spinning Master	6 Senior Research Assistant (Chemist)	7 Senior Research Assistant (Physicist)	8 Senior Research Assistant (Physicist)	9 Junior Research Assistant (Microscopist)	10 Junior Research Assistant
Vacant	—	Mr R D Mihra M.A. Agric (Oxon) Post Grad D.P. Agric (Oxon) Post Grad Res B. Litt (Oxon)	Dr Nazr Ahmad M.Sc PhD (Cantab) F Inst P	Mr R P Richardson F.T.I	Mr D L Sen M.Sc Tech (Manch) M.Sc (Bom) A.I.I.Sc A.I.C	Mr N Hari Rao M.Sc (Calcutta)	Mr Ram Saran Koshal M.Sc (Punjab)	Mr Amar Nath Gulati M.Sc (Punjab)	Mr C Nanjundayya M.Sc (Calcutta)
Mr P H Rama Reddi M.A. B.Sc I.A.S	On deputation from Madras Department of Agriculture	Late Head of Sciences Department Islamic College Lahore and Assistant Director Technological Laboratory Matunga Bombay	Demonstrator (Cotton Spinning) Technical School Oldham	Research Student at the Indian Institute of Science and Manchester College of Technology	Research Scholar Technological Laboratoty (Textile Physics)	Research Scholar Technological Laboratoty (Textile Physics)	Research Scholar Technological Laboratoty (Textile Physics)	Imperial Institute of Veterinary Research Mukteswar U.P	Research Scholar Technological Laboratoty (Textile Physics)
On deputation from Madras Department of Agriculture	—	Late Head of Sciences Department Islamic College Lahore and Assistant Director Technological Laboratory Matunga Bombay	Demonstrator (Cotton Spinning) Technical School Oldham	Research Student at the Indian Institute of Science and Manchester College of Technology	Research Scholar Technological Laboratoty (Textile Physics)	Research Scholar Technological Laboratoty (Textile Physics)	Research Scholar Technological Laboratoty (Textile Physics)	Imperial Institute of Veterinary Research Mukteswar U.P	Research Scholar Technological Laboratoty (Textile Physics)

LIST OF SCIENTIFIC AND TECHNICAL OFFICERS PAID FROM THE INDIAN CENTRAL COTTON COMMITTEE'S
Funds AS ON AUGUST 31ST 1935—contd

TECHNOLOGICAL LABORATORY BOMBAY—contd

			TECHNOLOGICAL LABORATORY BOMBAY—contd		
11	Jun or Research Assistant	Dr K R Sen D Sc (Dacca)	Mr V Venkataraman, M.A (Madras)	Mr V Venkataraman, M.A (Madras)	Research Scholar Technological Laboratory and Technological Assistant
12	Statistician and Personal Assistant	Dr Lavi Thoma Dr Ing (Germany)	Mr Herculano Lobo Lee (V J T I)	Mr Herculano Lobo Lee (V J T I)	Research Scholar Technological Laboratory and Technological Assistant
13	Temporary Chemist	Mr N Iyengar *	Mr H B Joshi B Sc	Mr H B Joshi B Sc	Statistical Assistant Labour Office Government of Bombay Bombay Lyalpur
14	Electrician	Mr S S Sukthankar LTC (V J T I)	Mr S S Sukthankar LTC (V J T I)	Mr S S Sukthankar LTC (V J T I)	Statistical Assistant Labour Office Government of Bombay Bombay Lyalpur
15	Spinning Assistant	Mr K G Deo	Mr R G Panvalkar B Sc	Mr R G Panvalkar B Sc	—
16	Senior Tester	Mr G D Bhude B Sc	Mr K V N Nayar	Mr K V N Nayar	—
17	Junior Tester	Mr V N Modak B Sc	Mr L V Sundaraman B A	Mr L V Sundaraman B A	—
18	Junior Tester	Mr P S Sambamurthy	Mr A J Fard	Mr A J Fard	—
19	Junior Tester	Mr G J Kharkar B Sc	Mr U K Bengal B A	Mr U K Bengal B A	—
20	Junior Tester	Mr Sastoor Saanson B Sc	Mr U K Bengal B A	Mr U K Bengal B A	—
21	Junior Tester	—	—	—	—
22	Junior Tester	—	—	—	—
23	Junior Tester	—	—	—	—
24	Junior Tester	—	—	—	—
25	Junior Tester	—	—	—	—
26	Junior Tester	—	—	—	—
27	Junior Tester	—	—	—	—
28	Junior Tester	—	—	—	—

LIST OF SCIENTIFIC AND TECHNICAL OFFICERS PAID FROM THE INDIAN CENTRAL COTTON COMMITTEE'S FUNDS AS ON AUGUST 31st 1935—*contd*

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TECHNOLOGICAL LABORATORY BOMBAY—*contd*

- | | | |
|----|-------------------|------------------------|
| 29 | Junior Tester | Mr P V Nachane B Sc |
| 30 | Junior Tester | Mr A B Khan B Sc |
| 31 | Junior Tester | Mr C S Ramanathan B Sc |
| 32 | Junior Tester | Mr M R Raut M Sc |
| 33 | Draughtsman | Mr B G Mehta |
| 34 | Statistical Clerk | Mr R Krishna Iyer |
| 35 | Statistical Clerk | Mr P K Wagle |
| 36 | Mechanic | Mr J B Kharas |

INSTITUTE OF PLANT INDUSTRY INDORE

- | | | | |
|----|----------------------------|---|---|
| 37 | Director | Mr F Keith Jackson N D A (Hons)
Dip Agr (Cantab) | Director of Research Department of
Agriculture Iraq (1923-30) |
| 38 | Geneticist and Botanist | Mr J B Hutchinson M A (Cantab) | Assistant Geneticist and Botanist
Trinidad (1926-33) |
| 39 | Chemist and Agronomist | Mr Y D Wad M A M Sc (Bombay)
A I I Sc | Research Student Indian Central
Cotton Committee |
| 40 | Extension Officer | Mr Miss Lal Savrena L Ag (Calcutta) | Six years as Assistant Farm Superintendent
United Provinces Subordinate Agricultural Service |
| 41 | Farm Superintendent | Mr G C Tambe B Ag (Bombay) | — |
| 42 | Plant Breeding Assistant | Mr Kabir Singh B Ag (Bombay) | — |
| 43 | Senior Botanical Assistant | Mr R L M Ghose M Sc (Allahabad) | — |

LIST OF SCIENTIFIC AND TECHNICAL OFFICERS PAID FROM THE INDIAN CENTRAL COTTON COMMITTEE'S FUNDS AS ON AUGUST 31ST 1935—contd

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		INSTITUTE OF PLANT INDUSTRY INPORE—contd	Research Student Indian Central Cotton Committee
44	Assistant Farm Superintendent	Mr S C Talesara B Ag (Bombay)	—
45	Junior Farm Assistant	Mr K M Sambote B Ag (Nagpur)	—
46	Personal Assistant	Mr A N Srivastava M Sc (Lucknow)	—
47	Statistical Assistant	Mr V G Panse B Sc (Bombay)	—
48	Genetical Assistant	Mr Bhola Nath M Sc (Punjab)	—
49	Junior Plant Breeding Assistant (Temporary)	Mr N S Apte B Ag (Bombay)	—
50	Chemical and Agronomical Assistant	Mr I Madhusudan Rao B A (Hons)	—
51	Artist	Mr J S Oscar	—
		BOMBAY RESEARCH SCHENES	
		(i) Broach Cotton Breeding Scheme	
52	Cotton Breeder	Mr P L Patel M Sc (Iowa U.S.A.)	On deputation from Bombay Department of Agriculture
53	Botanical Assistant	Mr A K Shah B Ag (Bombay)	—
54	Pathological Assistant	Mr Y S Kulkarni B Ag (Bombay)	(ii) Jagdeoss Cotton Breeding Scheme
55	Botanical Assistant	Mr V L Bhoskar B Ag (Bombay)	On deputation from Bombay Department of Agriculture
56	Entomological Assistant	Mr J D Kanadive B Ag (Bombay)	Research Student Indian Central Cotton Committee

LIST OF SCIENTIFIC AND TECHNICAL OFFICERS PAID FROM THE INDIAN CENTRAL COTTON COMMITTEE'S FUNDS AS ON AUGUST 31ST 1935—*contd*

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BOMBAY SEED DISTRIBUTION SCHEMES

		(i) <i>Hubb's Scheme</i>		
67	Agricultural Overseer	Mr B S Patil B Ag (Bombay) (ii) <i>Gadag Scheme</i>	—
68	Agricultural Overseer		Mr B S Tadsur B Ag (Bombay)	—
69	Cotton Assistant		{iii) <i>Surat Scheme</i>	On deputation from Bombay Department of Agriculture
70	Cotton Assistant	Mr V D Desai	Mr V V Patel B Ag (Bombay)	do
71	Agricultural Overseer		{iv) <i>Athans Scheme</i>	—
72	Cotton Superintendent	Amalner	Mr B M Dhumma B Ag (Bombay) (v) <i>Khandesh (Bawilla) Scheme</i>	On deputation from Bombay Department of Agriculture
73	Agricultural Overseer		Mr S V Shevde L Ag	—
74	Superintendent Bhadgaon Farm		Mr R B Nimbalkar B Ag (Bombay) Mr D M Kulkarni B Ag (Bombay)	On deputation from Bombay Department of Agriculture
75	Provincial Officer		BOMBAY COTTON FORECAST IMPROVEMENT SCHEME	On deputation from Bombay Department of Agriculture
76	Cotton Physiologist Sakrand	Mr G R Ambekar School Final	SIND PHYSIOLOGICAL RESEARCH SCHEME	—
77	Sen or Ass stant	Mr B M Dabral M Sc (Benares) Dr A M Shaikh M Sc (Bombay) Ph D (London) DIC AIC	Dr A M Shaikh M Sc (Bombay) Ph D	—

LIST OF SCIENTIFIC AND TECHNICAL OFFICERS PAID FROM THE INDIAN CENTRAL COTTON COMMITTEE'S FUNDS AS ON AUGUST 31st, 1935—contd.

SIND PHYSIOLOGICAL RESEARCH SCHEME—contd

68	Junior Assistant ..	..	Mr Rustom M Ranji, Dip Ag (Bombay) ..	On deputation from Bombay Department of Agriculture.
69	Junior Assistant ..	..	Mr H W Mughal, Dip Ag (Bombay) ..	—
70	Junior Assistant ..	..	Mr T J Malkani, M Sc (with distinction) (Bombay)	—
71	Statistical Assistant ..	..	Mr S S Churney, B Sc (Agra) ..	—
72	Cotton Supervisor, Indus Right Bank,	Mr H A Idnani, B Ag (Bombay) ..	..	Research Student, Indian Central Cotton Committee, on deputation from Sind Department of Agriculture
	Dada			On deputation from Sind Department of Agriculture.
73	Cotton Supervisor, Indus Left Bank, Mr Ghulam Mostafa, Practical Experience in Agriculture Mirkurkia	..	..	—
74	Senior Assistant to Cotton Supervisor, Mr Agha Khan Mahomed, 2 years' Lyallpur Course, Indus Left Bank	..	Do	do.
75	Senior Assistant to Cotton Supervisor, Mr W P Shahani, B Ag (Bombay) ..	..	Do	do.
76	Junior Assistant to Cotton Supervisor, Mr Lekhraj ..	..	Do	do.
77	Junior Assistant to Cotton Supervisor, Mr W R Shahani, Indus Right Bank.	..	..	—
78	Junior Assistant to Cotton Supervisor, Mr A. M Kureshi, Indus Right Bank.	..	..	—
79	Junior Assistant to Cotton Supervisor, Mr Premsing T Advani, Indus Right Bank	..	..	—

LIST OF SCIENTIFIC AND TECHNICAL OFFICERS PAID FROM THE INDIAN CENTRAL COTTON COMMITTEE'S FUNDS AS ON AUGUST 31st 1935—*contd*

SIND SEED DISTRIBUTION SCHEME—*contd*

80	Junior Assistant to Cotton Supervisor Indus Left Bank	Mr Partabsingh J. Balchhi	—
81	Junior Assistant to Cotton Supervisor, Indus Left Bank	Mr S A Sadik; Dip Agr (Bombay)	—
82	Junior Assistant to Cotton Supervisor, Indus Left Bank,	Mr K S Tharumal	On deputation from Sind Department of Agriculture
83	Junior Assistant to Cotton Supervisor Indus Left Bank	Mr T T Narandas	—
84	Junior Assistant to Cotton Supervisor, Indus Left Bank	Mr Atmaram	—
85	Junior Assistant to Cotton Supervisor, Indus Left Bank	Mr Nek Mohamed	—
86	Junior Assistant to Cotton Supervisor, Indus Left Bank	Mr Saleman	—
	

CENTRAL PROVINCES RESEARCH SCHEMES

(i) Botanical Scheme			
87	Economic Botanist for Cotton ..	.. Mr D N Mahta B.A (Oxon) F.L.S	On deputation from Central Provinces Department of Agriculture
88	Assistant to Economic Botanist for Cotton	Mr S C Roy L.A.G., and Post Graduate Pusa	Do do
89	Assistant to Economic Botanist for Cotton	Mr S S Pande M.Sc (Punjab)	Research Student Central Cotton Committee
90	Assistant to Economic Botanist for Cotton	Mr D G Sawangzorkar L.A.G (Hons)	On deputation from Central Provinces Department of Agriculture
91	Assistant to Economic Botanist for Cotton	Mr D L Janoria L.A.G (Hons)	Do do

LIST OF SCIENTIFIC AND TECHNICAL OFFICERS PAID FROM THE INDIAN CENTRAL COTTON COMMITTEE'S FUNDS AS ON AUGUST 31ST 1926—*contd*

CENTRAL PROVINCES BOTANICAL RESEARCH SCHEMES—*contd*

92 Assistant to Economic Botanist for Mr D Y Bhand L Ag (Hons)
Cotton

93 Assistant to Economic Botanist for Mr V N Paranjpe B Sc
Cotton

(iv) Entomological Scheme

94 Agricultural Assistant Mr M S Pathi B Ag

COMBINED LONG-STAPLE COTTON AND MARKETING OF VERUM COTTON SCHEMES IN C P AND BERAR

95 Agricultural Assistant Mr J P Tiwari B Ag

96 Agricultural Assistant Mr L P Khare B Ag

97 Agricultural Assistant Mr G N Wardakkar B Ag

98 Agricultural Assistant Mr L B Deshpande B Ag

99 Agricultural Assistant Mr N B Chincholkar B Ag

100 Agricultural Assistant Mr J N Kelkar B Ag

101 Agricultural Assistant Mr G C Tiwari Certificate Course of Agricultural College Nagpur

102 Agricultural Assistant Mr W R Patwardhan B Ag

103 Agricultural Assistant Mr K S S Chowdhary B Ag

104 Agricultural Assistant Mr L B Deshpande B Ag

105 Agricultural Assistant Mr Mohammad Isbaque B Ag

106 Agricultural Assistant Mr N P Konher B Ag

LIST OF SCIENTIFIC AND TECHNICAL OFFICERS PAID FROM THE INDIAN CENTRAL COTTON COMMITTEE'S FUNDS AS ON AUGUST 31ST 1935—contd.

COMMENDED LONG STAPLE COTTON AND MARKETING OF VARIOUS COTTON SCHEMES IN C P AND BERAR—contd

107 Agricultural Assistant Mr N K Galande B.Ag

MADRAS RESEARCH SCHEMES

(i) *Herbaceous Scheme*

- | | | |
|----------------------|-----------------------------------|---|
| 108 Senior Assistant | Mr R Balasubramana Ayyar B.A B.Sc | On deputation from Madras Department of Agriculture |
| 109 Junior Assistant | Mr G Seshadri Ayyangar M.A | — |
| 110 Junior Assistant | Mr V Ramaswami Mudaliar B.A | — |
| 111 Sub-Assistant | Mr D Devasvatham S S L C (Botany) | On deputation from Madras Department (Intermediate) |

(ii) *Pempheras and Physiological Scheme*

- | | | |
|----------------------------|--|---|
| 112 Bio-Chemist | Dr S Kasmatha Ayyar B.A Ph.D | On deputation from Madras Department of Agriculture |
| 113 Physiological Botanist | Mr T R Narayana Ayyar B.A (Cantab)
B.Sc (Ag.) | Do |
| 114 Assistant Botanist | Mr K Dharmendra Rajulu M.Sc (Bombay) | Research Student Indian Central Cotton Committee |
| 115 Assistant Botanist | Mr N G Narayanan B.Sc (Ag.) | — |
| 116 Assistant Entomologist | Mr V Margabandhu M.A | On deputation from Madras Department of Agriculture |
| 117 Assistant Entomologist | Mr P S Narayanaswamy B.Sc (Ag.) | Do do |
| 118 Assistant Chemist | Mr K Sapharish B.Sc (Ag.) | — |

LIST OF SCIENTIFIC AND TECHNICAL OFFICERS PAID FROM THE INDIAN CENTRAL COTTON COMMITTEE'S FUNDS AS ON AUGUST 31ST 1935—*contd.*

MADRAS RESEARCH SCHEMES—*contd.*

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119	Assistant	(iii) <i>Fodder Cholam Scheme</i> Mr M R Balakrishnan B.A. B.Sc (Agrn)	On deputation from Madras Department of Agriculture	
120	Assistant	Mr S Sundaram B.A. B.Sc (Agrn)	Do	do
		(iv) <i>Breeding of Nedam Cotton</i> Mr R Krishnamurthy B.Sc (Ag.)	Do	do
121	Assistant	MADRAS SEED DISTRIBUTION SCHEMES (i) Pay of Business Manager Co- Mr K Avudanayakam Pillai SSLC	On deputation from Madras Department of Agriculture	
		L Ag (ii) Co 2 Scheme Mr Damodara Prabhu B.Sc (Agrn)	Do	do
122	Business Manager	Tiruppur Cooperative Trading Society Ltd	Mr L Krishnan B.A. B.Sc (Agrn)	Do
			Mr P P Syed Mohamed B.Sc (Agrn)	Do
123	Agricultural Demonstrator		Mr P N Muthuswami B.Sc (Agrn)	Do
124	Agricultural Demonstrator		Mr T S Lakshmanan B.Sc (Agrn)	Do
125	Agricultural Demonstrator			
126	Agricultural Assistant			
127	Agricultural Assistant			
		PUNJAB RESEARCH SCHEMES (i) Botanical Scheme		
128	Cotton Research Botanist	Mr Mohd Afzal B.Sc (Agrl) (Punjab) AICTA (Tirumalai)	Research Student	Indian Central Cotton Committee and State Research Scholar
129	Assistant to Cotton Research Botanist	Chandhi Mohammad Akbar L.Ag	On deputation from Punjab Department of Agriculture	On deputation from Punjab Department of Agriculture

LIST OF SCIENTIFIC AND TECHNICAL OFFICERS PAID FROM THE INDIAN CENTRAL COTTON COMMITTEE'S FUNDS AS ON AUGUST 31ST 1935—*contd*

PUNJAB RESEARCH SCHEMES—*contd*

130	Agricultural Assistant	Mr Saroop Singh B Sc M Sc (Texas) U.S.A	On deputation from Punjab Department of Agriculture	182
131	Agricultural Assistant	Bh Autar Singh B Sc (Agr.)	—	—
132	Agricultural Assistant	Mr Akbar Ali B Sc (Post Graduate)	Research Student Cotton Committee from Punjab Department of Agriculture	—
133	Agricultural Assistant	Bh Santokh Singh B Sc (Agr.)	—	—
134	Agricultural Assistant	Ch Mohammad Rashid Khan L.C Course Munshi Fazl FA (Punjab University)	On deputation from Punjab Department of Agriculture	—
135	Statistical Assistant	Mr Bhagat Ram Sehgal M A (Punjab)	—	—
136	Assistant Cotton Entomologist	Mr M Haroon Khan B Sc (Hons) (London) A R C S (London)	—	—
137	Field Assistant Research Work	Mr Ladha Ram B Sc	—	—
138	Field Assistant Research Work	L. Ganda Ram B Sc F E L	—	—
139	Field Assistant	Mr Prave Mohan B Sc (Hons) M Sc	—	—
140	Field Assistant	Mr Manzoor Abbas B Sc (Agr.)	—	—
141	Field Assistant	Mr Ghulam Ullah B Sc (Agr.)	—	—
142	Field Assistant	Mr Bharm Bir Kohli B Sc (Agr.)	—	—
143	Junior Research Assistant	Mr Abdul Ghani B Sc (Agr.)	—	—
144	Statistical Assistant	Mr Prithvi Nath B Sc (Agr.)	—	—

(ii) *Entomological (Pink and Spotted Boll worm) Scheme*

INDIAN CENTRAL COTTON COMMITTEE'S

LIST OF SCIENTIFIC AND TECHNICAL OFFICERS PAID FROM THE INDIAN CENTRAL COTTON FUNDS AS ON AUGUST 31ST 1935—cont'd

PUNJAB RESEARCH SCHEMES—cont'd

145	Assistant Cotton Entomologist	(iii) <i>White Fly Scheme</i>	Mr. Nan Chand B Sc (Punjab)	L Kedar Nath Trehan M Sc (Punjab)	Research Student	Indian Cotton Committee	Central	183
146	Field Assistant	(iv) <i>Root Root Scheme</i>	Mr. Nan Chand B Sc (Agra)	—	—	—	—	—
147	Assistant Cotton Mycologist	(v) <i>Phytological (Periodic Partial Failure) Scheme</i>	Dr. R S Vasudeva B Sc Ph D (London) D I C (London)	On deputation from Bombay Education Department	On deputation from National Department	On deputation from National Department	On deputation from National Department	—
148	Plant Physiologist	Prof. R H Dastur M Sc F L S	Dr. A V Varadaraja Iyengar D Sc (Madras) A I D Sc A I C	—	—	—	—	—
149	Bio-Chemist	Mr. Abdul Ahad B Sc (Agra)	Mr. Abdul Ahad B Sc (Agra)	—	—	—	—	—
150	Agricultural Assistant	Mr. Such Singh B Sc (Agra)	Mr. Such Singh B Sc (Agra)	—	—	—	—	—
151	Agricultural Assistant	Mr. Ketul Kishan M A	Mr. Ketul Kishan M A	On deputation from the United Provinces Rourkela and Bundelkhand Survey Scheme	On deputation from the United Provinces Department of Agriculture	On deputation from the United Provinces Department of Agriculture	On deputation from the United Provinces Department of Agriculture	—
152	Statistician	Mr. Atar Singh L Ag (Cawnpore)	Mr. Atar Singh L Ag (Cawnpore)	—	—	—	—	—
153	Agricultural Inspector	HYDERABAD RESEARCH SCHEMES	(i) <i>Botanical Scheme</i>	Rai Sahib Kalidas Sawhney M Sc (Punjab)	Late Cotton Breeder in the Department of Agriculture Iraq Baghdad	Late Cotton Breeder in the Department of Agriculture Iraq Baghdad	On deputation from Bombay	On deputation from Bombay
154	Cotton Research Botanist	Mr. D V Narayanaaya Dip Agru (Poona)	Mr. D V Narayanaaya Dip Agru (Poona)	On deputation from Department of Agriculture	On deputation from Department of Agriculture	On deputation from Department of Agriculture	On deputation from Department of Agriculture	On deputation from Department of Agriculture
155	Agricultural Cotton Research Botanist	Mr. A. V. Narayanaaya Dip Agru (Poona)	Mr. A. V. Narayanaaya Dip Agru (Poona)	On deputation from Department of Agriculture	On deputation from Department of Agriculture	On deputation from Department of Agriculture	On deputation from Department of Agriculture	On deputation from Department of Agriculture

LIST OF SCIENTIFIC AND TECHNICAL OFFICERS PAID FROM THE INDIAN CENTRAL COTTON COMMITTEE'S FUNDS AS ON AUGUST 31ST, 1935—*contd.*

HYDERABAD RESEARCH SCHENES—*contd.*

(i) Botanical Scheme—*contd.*

166 Assistant Cotton Research Botanist Mr. V K Bedeker, B.A. (Madras), B.Ag On deputation from H E H, the
("Bombay"). Nizam's Department of Agriculture.

167. Inspector, Variety Testing Stations .. Mr. N R Yardi, B.Ag (Bombay) ..

(ii) Cotton Survey Scheme

168 Assistant Botanist Mr. B B Mulchandani, B.Ag (Bombay) On deputation from Bombay Depart-
ment of Agriculture.

169 Graduate Assistant Mr. M A Jaleel, B.Sc (Agra) (Comptabore)

(iii) Hyderabad (Pink and Spotted Boll worm) Scheme

170 Cotton Entomologist Mr. H D Nangpal, M.Sc. (Punjab) .. Research Student, Indian Central
Cotton Committee and Assistant Entomologist, United Provinces Pink Boll-worm Scheme.

171. Senior Research Assistant Mr. N T Nadkarni, B.Ag (Bombay) Post-
Graduate Course in Entomology at Poona Agricultural College

172. Junior Research Assistant Mr. T E Krishnaswamy, B.Sc (Agra) (Com-
before)

HYDERABAD SEED DISTRIBUTION SCHEME

173 Inspector Mr. M V Chittus Bakoda Roor Rot SCHEME.

BAKODA ROOR ROT SCHEME.

174 Cotton Breeder Mr. M S Pandya, B.Ag (Bombay). B.Sc On deputation from Bombay Depart-
ment of Agriculture

175 Breeding Assistant Mr. A F Patel, B.Ag (Bombay)

176 Mycological Assistant Mr. G H Desai, B.Ag (Bombay)

INDIAN CENTRAL COTTON COMMITTEE'S

LIST OF SCIENTIFIC AND TECHNICAL OFFICERS PAID FROM THE INDIAN CENTRAL COTTON COMMITTEE'S FUNDS AS ON AUGUST 31ST 1935—contd

HIRANER GANG CANAL SCHEME

— — —

— — —

— — —

Mr Arjan Singh B.Sc

Mr Jagur Singh

Bengal Comilla Cotton Scheme

— — —

Mr H K Majumdar M.Sc

167 Cotton Assistant Agricultural Officer TECHNOLOGICAL ASSISTANTS PAID BY INDIAN CENTRAL COTTON COMMITTEE

168 Mechanic Under Cotton Specialist Coimbatore Mr R L N Iyengar B.Sc
169 Under Cotton Breeder Dharwar Mr H R Nayak Inter Science (Madras)

170 Under Cotton Research Botanist Lyall Mr K G Deo
171 Under Cotton Research Botanist Lyall Mr K G Deo
172 Under Deputy Director of Agriculture Mr Srinagabhusana B.Sc (Mysore)
173 Under Botanist Surat Mr K. S Marar B.A LL.B

Do do

174 Under Botanist Agricultural Research Mr K. S Marar B.A LL.B
175 Research Student Indian Central Cotton Committee

176 Formerly Junior Tester at Technological Laboratory Bombay
177 Formerly Junior Tester at Technological Laboratory Bombay

APPENDIX XII.

RESEARCH STUDENTSHIPS

Year of appointment	Name	Where posted on appointment	Branch of Cotton Research in which scholarship granted	How now employed	REMARKS.
1923	Sohan Singh Bindra M.Sc <i>Honours School (Punjab)</i>	Lyalpur	Cotton Entomology		
	Mohammed Aftab B.Sc (Punjab)	Do	Cotton Botany Punjab (Plant Breeding)		
	Sheo Shankar Pande M.Sc (Punjab)	Nagpur	Do	Assistant to Economic Botanist for Cotton Central Provinces Botanical Research Scheme	Do
	Jiwan Singh M.Sc (Punjab)	Do	Cotton Mycology	Reader in Botany Khalsa College Amritsar	Late Senior Mycological Assistant Central Provinces Wilt Investigation Scheme
	Ilabato Banerji M.Sc (Calcutta)	Comptatore	Cotton Botany	University Botany Calcutta University from January 1929	Held a Senior Research Studentship under Dr M. A. Sampath Kumar and at the Institute of Plant Industry Indore from April 1926 to March 1928

RESEARCH STUDENTSHIPS—contd

Year of appointment	Name	Where posted on appointment	Branch of Cotton Research in which scholarship granted	How now employed	REMARKS	
6 1923	B N Desai, B.Sc (Bombay)	Dharmar	Cotton Botany	Sind Agricultural Department, Cotton Breeder, Sind, Murpurkhas	Field a Senior Research Studentship at the Institute of Plant Industry, Indore, from July 1926 to June 1927	Indian Central Cotton Committee
1924	Atul Chandra Dutta, M.Sc (Calcutta)	Cambatore	Do	Lecturer in Botany Cotton College, Gauhati Assam	Do	Do
"	N. Hari Rao, M.Sc (Calcutta)	Textile Physics Research Laboratory, Matunga, Bombay	Textile Physics	Senior Research Assistant Indian Central Cotton Committee	Do	Do
"	H. D. Nangpal, M.Sc (Honours School (Punjab)	Cambatore	Cotton Entomology	Entomologist, Hyderabad	Do	Do
"	Sant Bahadur Singh, M.Sc (Banaras Hindu University)	Surat	Cotton Physiology	Pink and Spotted Boll worm Investigation, Farbhama worm scheme, Farbhama	Do	Do
1925	Vishwa Ram Singh L. Ag (Agricultural College, Cawnpore)	Cawnpore	Cotton Entomology	United Provinces Subordinate Agricultural Services	Do	Do
"	Akbar Ali, B.Sc (Punjab)	Lahalpur	Do	Botany Department, Agricultural Research Scheme	Do	Do

RESEARCH STUDENTSHIPS—contd

Year of appointment	Name	Where posted on appointment.	Branch of Cotton Research in which scholarship granted	How now employed	Remarks
1925	Kidar Nath Trehan M Sc (Panjab)	Lyalpur	Cotton Entomology	Punjab Agricultural Department Assistant Entomologist White Fly Investigation Scheme Punjab	Held Senior Research Studentship for study of White Fly problem at Khanewal Indian Central Cotton Committee 188
	S E Kumara B A M Sc (Bombay)	Technological Research Laboratory Matunga Bombay	Cotton Technology	Technological Assistant Dharwar up to 31st July 1929 Went abroad for further study Indian Central Cotton Committee	Resigned in July 1925
	J D Rautive B Ag (Bombay)	Dharwar	Cotton Mycology	Pathological Assistant Cotton Breeding Scheme Jalgao Khandesh	
	P K Roy M Sc (Dacca)	Technological Research Laboratory Matunga Bombay	Textile Physics	Technological Assistant Lyallpur	Indian Central Cotton Committee Obtained a Doctorate (D Sc) in 1934 Resigned in August 1926
	K R Sen M Sc (Dacca)	Do	Do	Lecturer in Botany Central College Bangalore	
	L N Rao M Sc (Calcutta)	Do	Cotton Microscopy	Head of the Textile Manufactures Department Victoria Jubilee Technical Institute Bombay	
7	D F Kapadia B A (Bombay) M Sc (Tech) (Manchester)	Do	Cotton Technology	Late Senior Research Assistant Assistant Technologist Technical Research Laboratory Matunga Bombay	

RESEARCH STUDENTSHIPS—contd

Year of appointment	Name	Where posted on appointment	Branch of Cotton Research in which scholarship granted	How now employed	Remarks
1920	Ram Saran Kosalal (Punjab)	M Sc Technological Research Laboratory Watunga, Bombay	Textile Physics	Senior Research Assistant Indian Central Cotton Committee	
	M A Shama Iyengar B Sc (Bombay)		Cotton Physiology	Assistant Technological Research Laboratory Matunga, Bombay Sind Agricultural Department Senior Scientist to Agricultural Chemist and Soil Physicist Sakarand	Awarded a Training Grant for foreign study in 1933
	Karam Singh Lamba B Sc Honours School (Punjab)	Lahalpur	Cotton Entomology	Resigned in July 1927	
	V D Wad M A (Bombay) M Sc	Coimbatore	Cotton Biochemistry	Chemist and Agronomist Institute of Plant Industry Indore	Indian Central Cotton Committee
	M A Iannai B Sc (Bom Bhiy)	Institute of Plant Industry, Indore	Cotton Botany	Sind Agricultural Department Cotton Supervisor Indus Light Bank Sind Seed Distribution Scheme Dadu Assistant Farm Superintendent Instituto of Plant Industry Indore Technological Assistant Comptatore	Do
	C Rilevra B Sc (Bom Bhiy)		Do	Do	Do
1927	K Lakshminarayana Iyer Khar B Sc (Mysore)	Techological Research Laboratory, Watunga Bombay	Cotton Technology	Assistant Chemist Indian Lac Research Association	
	Amant Krishna Thakur, M Sc (Bombay)	Institute of Plant Industry, Indore	Cotton Bio-chemistry		
	Dev Raj Mehta B Sc Honours School (Punjab)	Lahalpur	Cotton Entomology		Secured Government Scholarship for study abroad and obtained Ph D (Cantab)

RESEARCH STUDENTSHIPS—contd

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Year of appointment	Name &	Where posted on appointment	Branch of Cotton Research on which scholarship granted	How now employed	REMARKS
1917	Uma Shankar M Sc (Allahabad)	Cawnpore	Cotton Entomology	Visist Professor of Zoology and Entomology Agricultural College Cawnpore Unemployed	Obtained Doctorate at Edinburgh
	Shridhar Sharmrao Rane M Sc (Benares Hindu University)	Institute of Plant Industry, Indore	Plant Physiology		Awarded a Foreign Scholarship by the Indian Central Cotton Committee
	Sant Singh Verma M Sc (Benares Hindu University)	Dharwar	Cotton Physiology in connection with Cotton Walt Investigation		Obtained Ph D (Lond.)
	Lakshmi Narayan Mathur M Sc (Punjab)	Institute of Plant Industry, Indore	Cotton Breeding	Crop Botanist Ujjain Gujral Department of Agriculture	
	Kadaba Rangaswamy M Sc (Calcutta)	Coimbatore	Do	Unemployed	
	S Shamser Singh M Sc (Punjab)	Institute of Plant Industry, Indore	Cotton Agronomy	Agricultural Officer Bikaner State	
1918	K Dharmarajulu M Sc (Bombay)	Dharwar	Cotton Mycology	Assistant Botanist Madras Indian Central Cotton Pemphères and Physiological Scheme	
	Pare Mohan B Sc Honours (Punjab)	Cawnpore School (Punjab)	Cotton Entomology	Field Assistant Parasite Work Punk and Spotted Boll worm Scheme Punjab	
	R N Gidwani B Ag (Bom bay)	Surat	Cotton Agronomy	Sind Agricultural Department Inspector of Agriculture Eastern Nara Circle Murpurkhas M adras Agricultural Service	
	M Kanti Raj M A B Sc (Agrn) (University of Calcutta)	Institute of Plant Industry, Indore	Do	Junior Research Assistant Indian Central Cotton Committee	
	C Nanjundayya M Sc (Calcutta)	Technological Research Laboratory Matunga Bombay	Cotton Technology	Technological Research Laboratory Matunga Bombay	

RESEARCH STUDENTS—contd.

Year of appointment	Name	Where posted on appointment	Branch of Cotton Research in which scholarship granted	How now employed	REMARKS
1927	Sunagabhushana B.Sc	Technological Research Laboratory Matunga, Bombay	Re Cotton Technology	Technological Surat	Assistant Indian Central Cotton Committee
1930	Phu Pratap Singh Bhullar B.Sc (Agric) (Panjab) Bhai Ajit Singh Gulari B.Sc (Agric) (Punjab) Malin Lal Nath M.Sc (Panjab) Lal Nath M.Sc (Panjab)	Mallapur Do Do Institute of Plant Industry, Indore	Cotton Marketing and Economics Entomology Cytology and Plant Breeding	Punjab Agricultural Department Do Abroad for further study Genetical Institute of Plant Industry, Indore	Assistant Indian Central Cotton Committee
1931	Fran Nath Metra M.Sc (Panjab) Brahmendra Nath Bhattacharya M.A (Lucknow) B.S. Singhuril Ag Jay K. Dohre B.Sc (Nagpur)	Sakharan Lucknow Nagpur	Cotton Marketing and Economics Do Do	Do Do Do	Dist. Supervisor Enquiry into the cost of production of Cotton and Sugar cane crops Central Provinces Agricultural Research Scheme, Punjab Botanical Research Service Under training
1935	Vantoh Singh Jaggi B.Sc (Vellore) Doraiswami Ayyar B.Sc (Agric) (Mysore) Krishna Lehm Lal Ph D (Edinburgh)	Vellore Mysore Mysore	Do Cotton Entomology	Asst. Indian Central Cotton Committee Under training	Under training
1937	Suni Singh Verma M.Sc (Banaras Hindu University)	London	Jarrow Research Studentships Imperial College of Plant Physiology	Completed July 1935 Obtained Ph.D of London University	

RESEARCH STUDENTSHIPS—contd

Year of appointment	Name & I	Where posted on appointment	Branch of Cotton Research in which scholarship granted	How now employed	Remarks
1947	Uma Shankar (Allahabad)	M Sc Cawnpore	Cotton Entomology	Assist Professor of Zoology and Entomology Agricultural College Cawnpore	Obtained Doctorate at Edinburgh
	Shridhar Shamrao Rane M Sc (Banaras Hindu University)	Institute of Plant Industry, Indore	Plant Physiology	Awarded a Foreign Scholarship by the Indian Central Cotton Committee	
	Sant Singh Verma M Sc (Banaras Hindu University)	Dharwar	Cotton Physiology in connection with Cotton Wilt Investigation	Obtained Ph D (Lond.)	
	Lakshmi Narayanan Mathur M Sc (Punjab)	Institute of Plant Industry Indore	Cotton Breeding	Crop Botanist Ujjain Gujjar Department of Agriculture	
	Radaba Rangaswamy M Sc (Calcutta)	Coimbatore	Do	Unemployed	
	S Shamser Singh M Sc (Punjab)	Institute of Plant Industry Indore	Cotton Agronomy	Agricultural Officer Bikaner State	
	K Dharmarajulu M Sc (Bombay)	Dharwar	Cotton Virology	Assistant Botanist Madras Pemphères and Physiological Scheme	Indian Central Cotton Committee
1948	Pare Mohan B Sc Honours (Punjab)	Cawnpore School (Punjab) M Sc	Cotton Entomology	Field Assistant Parasite Work, Pink and Spotted Boll worm Scheme Punjab	Do
	R N Gidwan B Ag (Bengal)	Surat	Cotton Agronomy	Sind Agricultural Department Inspector of Agriculture Eastern Nara Circle Virpurkhas M adras Agricultural Service	
	M Krishn Raj M A B Sc (Agric) (University of Trichy)	Institute of Plant Industry Indore	Do	Junior Research Assistant Technological Laboratory Matunga Bombay	Indian Central Cotton Committee
	C Nanjundayya M Sc (Calcutta)	M S Technical Cotton Technology Research Laboratory Matunga	Cotton Technology Research Laboratory Matunga		

RLSI ARCHI STUDEN FSHPs—contd

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Year of admission	Name	Where posted on appointment	Branch of Cotton Research in which scholarship granted	Now now employed	Remarks
<i>Training Grants</i>					
1933	N Venkataswamy B Sc (Agra) (Madras)	Cuttack	Cotton Statistics	Madras Agricultural Service	
2	C Lagannatha Rao (Madras)	II	Cotton Physiology	Research Student	Under training
<i>Foreign Training Grants</i>					
1933	M Taskir Ahmad (Agra) (Punjab)	B Sc Trinity Cambridge	College Entomology	Assistant Entomologist Imperial Institute of Agricultural Research Pusa	
2	B Patel B V (Born Bar)	University of Lemnos U S (Bar)	Cotton Breeding	Research Student	Under training
1934	M A Shaukat Syengar (Bombay)	Tour in Hungary England and Egypt	Study of Kalar (al kal) lands and cultivation o superior Egyptian cottons with special reference to soil and envi ronmental condi tions	Sind Agricultural Depart ment Senior Assistant to Agricultural Chemist and Soil Physicist	
	Nazr Ahmad V Sc (Punjab)	Imperial College of Science and Tech nology London	Entomology	Research Student	Under training

Indian Central Cotton Committee in the remarks column indicates a post paid for from one of the Committee's Research Grants

